DEPARTMENT OF THE INTERIOR AND RELATED AGENCIES APPROPRIATIONS FOR FISCAL YEAR 2004

THURSDAY, MAY 22, 2003

U.S. SENATE,
SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,
Washington, DC.

The subcommittee met at 9:30 a.m., in room SD–124, Dirksen Senate Office Building, Hon. Conrad Burns (chairman) presiding.

Present: Senators Burns, Domenici, Dorgan, and Byrd.

DEPARTMENT OF ENERGY

OFFICE OF THE SECRETARY

STATEMENT OF HON. SPENCER ABRAHAM, SECRETARY

OPENING STATEMENT OF SENATOR CONRAD BURNS

Senator BURNS. We're going to call the committee to order this morning, Mr. Secretary, thank you for coming. I've got a brief statement on my opening and then the ranking member, Senator Dorgan, will be along soon and we will take his statement and if he has questions, we will allow him to do that. He's running on a tight tether today, and I understand you are too. And I think we are going to have a stack of votes this morning, and with the President being in HC–5, once you get into the bowels of that building, it takes a while to free yourself.

First of all, we're glad to see you here to discuss the budget this morning for the Department of Energy. I know we struggled a bit to get this hearing on your schedule and I know you made some changes to accommodate us, we appreciate that.

The Department's request for activities under the subcommittee's jurisdiction represents an effective cut of around $120 million. That is a considerable reduction for energy activity. Of course the reason it falls under this committee is because of the vast amount of our energy found on public lands under our jurisdiction. We can quibble over transfers and deferrals, but I think it's fair that we discuss some of these reductions as that is the reason we hold these hearings.

Within the total you have requested, there are some very healthy increases in some selected programs. The budget increases weatherization by $65 million, in keeping with the President's intention to double the program. The budget includes $40 million for the National Climate Change Technology Initiative for climate change-re-

lated research, $23 million of which is under this subcommittee's jurisdiction. And the budget increases fuel cell research within the Office of Energy Efficiency by $22 million, and includes the increases to support the President's Freedom Car Initiative.

We are anxious to hear more about these proposals, Mr. Secretary, and I expect you will find at least conceptual support for many of them from this subcommittee. The problem is that the budget also includes fairly severe cuts in other important programs. The oil and gas programs within the Office of Fossil Energy have been cut in half. The fuels program within the Office of Fossil Energy has been completely eliminated, and the Industries of the Future program has been reduced about two-thirds.

We recognize, Mr. Secretary, that you are compelled to operate under some fairly restrictive budget constraints and we are certainly not opposed to reducing some programs in favor of others as national priorities change, and as successes and failures in your research programs become known.

But I think what you will find concerns us most is the severity of some of these reductions, and the fact that some of them may result in us failing to capitalize on important research that has been supported by this committee for many, many years, and the research done in those areas has been fairly sizable. It is important, Mr. Secretary, to maintain a robust and balanced R&D program in the Department, one that enhances our Nation's energy security and enables our economy to grow without sacrificing environmental quality, and I think the focus today will be whether your budget request is adequate to sustain such a program.

Your testimony will help us as we begin to draft this appropriations bill under some very tight constraints and again, we appreciate you being here this morning. I think it will also help our deliberations on the energy bill, which I hope the Senate will return to after the Memorial Day recess.

I now turn to our ranking member, my good friend from North Dakota, Senator Dorgan. Good morning.

OPENING STATEMENT OF SENATOR BYRON L. DORGAN

Senator DORGAN. Senator Burns, thank you very much, and thank you for holding this hearing.

Senator BURNS. You didn't bring any more weed this morning?

Senator DORGAN. Since we're dealing with the Energy Department, I should have brought a gallon of gas perhaps, but the chairman is referring to a noxious weed that I brought to the last hearing, but I am not going to do that in the future. I didn't know it was very effective.

Let me thank the Secretary for being here. The Secretary and I had a chance to visit yesterday, and I know that you are under certain restraints, that there really isn't any way that you could tell us or the audience, or for that matter the press what you really think of the Office of Management and Budget. So, I will not ask you about that, but let me raise a couple issues, some of the same issues that Senator Burns raised.

You know I'm concerned about the decrease for energy conservation research, I talked to you about that yesterday. I think cutting energy conservation research is moving in exactly the wrong direc-

tion. I appreciate that the funding for the larger energy efficiency and renewable office funded in the energy and water bill is up slightly less than 1 percent, but renewable energy research, while important in its own right, is not a substitute for efforts focused on conserving the amount of energy we use. We use a prodigious amount of energy in this country as I've stated, and it is exactly the same calculation, and we consume 25 percent of the world's energy, which points to our need to focus on research and development efforts in reducing the amount of energy consumption, so I'm concerned about that.

My colleague Senator Burns said that the budget severely undercuts fossil energy R&D, which accounts for 85 percent of the energy resources in this country. Over half of our electricity comes from coal, and oil and natural gas account for almost 100 percent of our transportation energy needs. Because of this, environmentally sound approaches to the management of fossil energy certainly is essential to our national energy security.

Now, we need money for new initiatives, but money for new initiatives should not come from other initiatives that are also very important. We talk about a hydrogen economy and fuel cells, and I am very appreciative of the present research in that area and this is a direction we ought to head, I don't think you can overstate the importance of that. It is very important. I have said that we need an Apollo-type program, a program that is bold and aggressive, and I suggested around $6.5 billion over a period of years. But having said all that, I'm very impressed that the administration put itself on record saying let's move in this regard. So the question isn't the direction so much as it is velocity, and I hope that we can wrap this up into an Apollo-type program. But we should not be believing that even as we move in that direction we are going to somehow diminish the use of coal, oil and natural gas long into the future, and the ability to do that in a thoughtful way requires that we have adequate research.

As Senator Burns knows, we have a Commerce Committee hearing ongoing at the moment and I have another appropriations subcommittee as well, so I will not be able to stay for questions, Mr. Secretary, but you and I covered most of our concerns yesterday in the meeting in my office. And again, I was pleased to serve with you in the Congress, here in the Senate, and I am really pleased you are where you are.

Secretary ABRAHAM. Me as well, thank you, Senator.

Senator BURNS. Thank you, Senator Dorgan. Mr. Secretary, we look forward to your statement.

SUMMARY STATEMENT OF HON. SPENCER ABRAHAM

Secretary ABRAHAM. Thank you, Mr. Chairman, and you and the ranking member, we obviously served together for a number of years and have come to these projects we work on together from a background of previous successful collaboration, and I look forward to continuing that again this year.

Mr. Chairman, what I propose is that I submit most of the testimony I have here for the record rather than in an oral presentation, give a very brief overview so that we can move ahead with the hearing.

Our fiscal year budget for the Department of Energy, both the component within this subcommittee as well as the component within the Subcommittee on Energy and Water is a request for $23.4 billion, and we believe it will allow the Department to help address a number of issues that relate to America's safety and security. This amount is $1.3 billion above the fiscal year 2003 budget request, which is a 5.9 percent increase overall.

We do recognize, Mr. Chairman, the critical contribution of energy on national defense, that the environment and science and technology make to a prosperous as well as a peaceful future, and I think this budget continues that work. With regard to our energy work, the energy sector, this budget submission is collectively between both subcommittees $2.5 billion. We think it will allow us to continue our wide-ranging efforts that will lead to the eventual transformation of our energy economy.

I think the most exciting work and promising areas of long-term research and technology expansion either fall wholly or in large part within the province of this subcommittee, so I think not just this year but in the years ahead, we are going to see a great deal of activity going on in programs that this subcommittee has appropriations responsibility for.

Our fossil energy promotes this administration's belief that coal must be a critical part of our long-term energy future. We recognize coal is abundant, it is comparatively inexpensive and is going to be used here and around the world. Our administration appreciates environmental concerns regarding coal and will devote technology to answer those concerns and to guarantee the future widespread use of coal. That's the rationale between the President's Clean Coal Power Initiative, which seeks $2 billion over 10 years to companies that work on and test technologies that improve power plant generation and emission of coal.

In addition, we recognize carbon management requires special attention and that's why our budget this year features a 60 percent increase for research into carbon sequestration, which in my view and I think in our judgment will be a key to finding methods and technologies to reduce, avoid or capture greenhouse gas emissions. More importantly, it is that interest as much as any which was behind our recently announced coal-powered generation project of the future, we call it Future-Gen, which will lead us to operate the world's first coal-fired, emission-free power plant. Future-Gen will take on the challenge of cutting electricity emissions and sequestration of greenhouse gasses and promote the increased use of hydrogen in meeting future energy needs. It is one of, I think, the most bold steps we can take towards a pollution-free energy future.

In addition to the game-changing research in the clean coal area, we are likewise engaged in another initiative that in my judgment will lead us to a transformation in the energy world with the development of hydrogen fuel cells, as Senator Dorgan referred to earlier, as a power source. Hydrogen is the most abundant element in the universe, with nearly a limitless supply, and the use of hydrogen eliminates many of the consequences currently associated with fossil fuels. Our administration is very optimistic about the use of hydrogen as the transportation fuel of the future. As the President noted in his State of the Union address, we are similarly exploring

the use of hydrogen to generate electricity to heat our homes and power our businesses, proposing to spend about $1.7 billion dollars on hydrogen fuel cell research and development, and the development of the transportation applications of hydrogen.

PREPARED STATEMENT

I can think of no other program with the potential payoff for our Nation's security, our economic security, our foreign policy and especially for the environment as the work we're going to be doing on hydrogen. I think some day people may look back on that initiative as one of the greatest achievements of this time, and perhaps connect it up to the activities of this subcommittee. We look forward to working with the committee on these exciting new ventures as well as our ongoing work related to weatherizaton assistance programs, natural gas, and a host of other topics that time doesn't permit me to go into discussion at this moment of these various other initiatives, as well as the ones I mention in my written testimony. I look forward in the Q and A session to having the chance to respond to any questions that you might have.

[The statement follows:]

PREPARED STATEMENT OF HON. SPENCER ABRAHAM

INTRODUCTION

Mr. Chairman, and Members of the Subcommittee, it is a pleasure to be here today to discuss the President's fiscal year 2004 Budget request for the Department of Energy (DOE).

The total fiscal year 2004 Budget request for the Department of Energy is $23.4 billion (excluding $123 million advanced appropriated/deferred from fiscal year 2003). This amount is $1.2 billion above the fiscal year 2003 appropriated level. This Administration recognizes the critical contribution our work on defense, energy security, the environment and world-leading science and technology makes to a peaceful and prosperous future. Of the total $23.4 billion request, $1.7 billion is requested for programs funded in the Interior and Related Agencies Appropriation under the jurisdiction of this Subcommittee. The $1.7 billion Interior Appropriations request is $76.7 million less than appropriated in fiscal year 2003.

The total fiscal year 2004 Budget continues the Administration's commitment to ensure national defense and safeguard the Nation's energy security through advances in science and technology, as well as fulfill our obligation as the environmental stewards to our communities. While DOE's national policy objectives have not changed, this budget reflects a new approach toward conducting business at the Department of Energy. Reengineering efforts that we began in fiscal year 2002 have taken shape: programmatic activities are better focused to achieve primary mission objectives, budget priorities are set with improved measurable performance criteria, and corporate management initiatives reflect aggressive implementation of the President's Management Agenda.

The President's fiscal year 2004 Budget for the Department of Energy reflects, and addresses, the critical challenges we face today and will continue to face in the coming decades. I have charted a course for the Department of Energy that emphasizes DOE's critical contributions to the Nation's national security and provides forward-reaching solutions to America's energy problems. My priorities are to meet our responsibilities to maintain the nuclear stockpile; expand and make more comprehensive our non-proliferation activities; accelerate the environmental cleanup program; develop 21st century cutting edge advanced fuel cell and alternative energy technologies; maintain coal as a major, low-cost, domestically produced, energy resource through the Coal Research initiative; build and maintain a stable and effective national defense program to respond to the guidance in the Nuclear Posture Review with special emphasis on revitalizing laboratory and production plant infrastructure; continue our leadership to ensure nuclear power remains a key energy resource; and maintain a world class scientific research capability. The fiscal year 2004 Budget is focused to deliver on these priorities.

As part of the Department's Strategic Planning process these priorities translate into six overlapping Departmental goals that form our core mission of National Security. All of the Department's planning and budgeting for fiscal year 2004 drives toward these six goals:

—Maintain a safe, secure and reliable nuclear deterrent
—Control nuclear proliferation
—Reduce dependence on energy imports
—Achieve a cleaner, healthier environment
—Improve our energy infrastructure to ensure the reliable delivery of energy, and
—Maintain a world-class scientific research capability

Formulation of this year's budget reflects significant management changes occurring within the Department of Energy. Guided by the President's Management Agenda and my management reforms started in fiscal year 2003, this budget implements integrated, long-term program planning and performance accountability. The Department is implementing a five-year programmatic and planning framework to provide an unprecedented opportunity to consider future impacts in determining this year's funding priorities. This budget was formulated to deliver measurable results to reach the Department's strategic goals. This achievement is a significant step toward reaching my key goal to focus DOE activities to adhere to the primary mission of national security. By streamlining program activities and management structures, the Department of Energy will more effectively and efficiently manage and produce the results expected by American taxpayers.

PRESIDENT'S MANAGEMENT AGENDA AND NATIONAL ENERGY POLICY COORDINATION

Rising to the challenge of the President's Management Agenda, the Department is beginning to improve how it manages, budgets, and plans for all programs, projects, and activities. By improving management, performance, and accountability, the Department is striving for a level of performance that keeps DOE programs safe, on track, and on budget. A system of scorecards is being used to evaluate the effectiveness of various programs and allocate resources to achieve this end. Performance measures are improving to ensure that they are specific, quantifiable, concise, comprehensive, and relevant to the American taxpayer. Also, in accordance with the President's commitment to an expanded and effective electronic government, DOE is centrally managing information technology investments to reduce waste, increase productivity, and provide increased corporate services at lower cost.

Research and Development Investment Criteria.—The President's Management Agenda calls for consistent and sufficient evaluation of future research and development (R&D) investments and past performance. In response, the Department developed internal guidance for programs to score their R&D activities against the Administration's applied R&D investment criteria. This approach focuses R&D dollars on long-term, potentially high-payoff activities that require Federal involvement to be both successful and achieve public benefit. The Department will continue to work to develop consistent scoring and benefit estimation methods, to permit comparison of applied R&D programs across the Department.

The applied R&D scorecard process is an important way the Department is integrating performance into the budget. The scorecard process is in its second year of development. The goal is to develop highly analytical justifications for applied research portfolios in future budgets. This will require the development and application of a uniform cost and benefit evaluation methodology across programs to allow meaningful program comparisons.

The Department's Science programs also participate in the government-wide effort to evaluate basic research efforts against the criteria of quality, relevance, and performance. As part of this first year effort for basic research programs, the Office of Science has incorporated the principles of the investment criteria into the formulation of its Congressional budget narrative.

Program Assessment Rating Tool.—In addition to the use of R&D investment criteria, the Department implemented a new tool to evaluate the management effectiveness of selected programs. The Program Assessment Rating Tool (PART) was developed by the Office of Management and Budget (OMB) to provide a standardized way to assess the effectiveness of the Federal Government's portfolio of programs. While OMB's objective for fiscal year 2004 was to evaluate 20 percent of each government agency, the Department of Energy reviewed nearly 60 percent of its activities through the PART process. The Departmental elements that participated were Environmental Management, Science, Fossil Energy, Nuclear Energy, Energy Efficiency and Renewable Energy, the Power Marketing Administrations, and the National Nuclear Security Administration.

The structured framework of the PART provides a means through which programs can assess their activities differently than through traditional reviews. While some of the programs received less than favorable scores, the information exchange between the Department and OMB proved quite valuable. The current focus is to establish outcome- and output-oriented goals, the successful completion of which will lead to benefits to the public, such as increased national security and energy security, and improved environmental conditions. The Department will incorporate feedback from OMB into the fiscal year 2005 Budget and planning process, and will take the necessary steps to continue to improve performance. The results of the review are reflected in the Department's fiscal year 2004 Budget. The refocusing of the Fossil Energy Oil and Gas program was supported by the results of the PART review.

National Energy Policy Office.—The Department of Energy has established a National Energy Policy Office to provide strategic direction within DOE and overall coordination within the Federal Government with respect to implementing national energy plan recommendations and activities to assure dependable, affordable, and environmentally responsible production, delivery, and use of energy. This Office's mission is to achieve measurable performance results and consistency in implementing our national energy goals through effective policy development, planning and management strategies that are integrated into DOE's budgeting process and that foster interagency and intergovernmental coordination, generate public-private collaboration, and enhance international cooperation. Through such coordination and integrated policy planning and budgeting, the Office will assure performance results that advance and safeguard our national energy security objectives by assuring access to reliable and affordable energy supplies through a balanced and diversified portfolio of energy sources and modernization of energy infrastructure; securing continuous improvement in energy efficiency and conservation through technology research development and deployment to manage effectively and extend our energy resources, reduce demand and lower costs; assuring environmental progress and sustainable growth; and assuring that a robust market guides pricing, technology deployment, energy efficiency, fuel selection and energy systems.

INTERIOR AND RELATED AGENCIES APPROPRIATION BUDGET REQUEST

I would now like to address some of the specifics of our fiscal year 2004 Interior and Related Agencies Appropriations request.

In total for fiscal year 2004, we are requesting $1.7 billion. This amount is $76.7 million less than appropriated in fiscal year 2003. By appropriation, we are requesting $519.3 million for Fossil Energy Research and Development; $16.5 million for Naval Petroleum and Oil Shale Reserves; $36.0 million for the 6th payment in the Elk Hills School Lands Fund; $875.8 million for Energy Conservation; $1.0 million for Economic Regulation; $175.1 million for Strategic Petroleum Reserve; $5.0 million for the Northeast Home Heating Reserve; and $80.1 million for the Energy Information Administration. In addition, fiscal year 2003 appropriations action advance appropriated $36.0 million for the 5th payment in the Elk Hills School Lands Fund and deferred $87.0 million of Clean Coal Technology balances into fiscal year 2004. This brings the fiscal year 2004 total to $1.8 billion.

I would now like to address some specifics of the Fossil Energy, Energy Conservation, and Energy Information Administration budget requests.

FOSSIL ENERGY BUDGET REQUEST

Mr. Chairman, when he took over as Assistant Secretary for Fossil Energy last year, I asked Assistant Secretary Mike Smith to realign the Fossil Energy program to focus virtually and exclusively on supporting three of the President's top energy and environmental initiatives: Clear Skies, Climate Change, and Energy Security.

To be included in the fiscal year 2004 Budget, Fossil Energy programs must either support the development of lower cost, more effective pollution control technologies or help diversify the Nation's future sources of clean-burning natural gas to meet the President's Clear Skies goals; expand the Nation's technological options for reducing greenhouse gases either by increasing power plant efficiencies or by capturing and isolating these gases from the atmosphere; or measurably add to the Nation's energy security by providing a short-term emergency response (e.g., Strategic Petroleum Reserve) or a longer-term alternative to imported oil (e.g., hydrogen and methane hydrates).

President's Coal Research Initiative.—The fiscal year 2004 Budget continues to meet the President's commitment to spend $2 billion on clean coal research over 10 years by providing $320.5 million for the President's Coal Research Initiative. Since our budget testimony last year, the Department has made significant progress on a new generation of environmentally-clean coal technologies.

Our "first round" solicitation in the Clean Coal Power Initiative—the centerpiece of the President's clean coal commitment—attracted three dozen proposals for projects totaling more than $5 billion. On January 15, 2003, we announced the first winners of this competition—eight projects with a total value of more than $1.3 billion, more than one billion dollars of which would be provided by the private sector. Industry has again stepped up to the table, offering both good ideas and significant private sector cost-sharing.

In fiscal year 2004, we are requesting $130.0 million as the next "installment" of the Clean Coal Power Initiative. At the present time, our plans are to issue competitive solicitations every 2 years—the next one in the fall of 2004. As in the initial solicitation, we propose to combine 2 years of appropriations (and any available funds from prior solicitations) because of the size and scope of the projects.

The President's Clean Coal Power Initiative is especially significant because it directly supports the President's Clear Skies initiative. The first projects, for example, included an array of new cleaner and cheaper concepts for reducing sulfur dioxide, nitrogen oxides, and mercury—the three air pollutants targeted by the Clear Skies initiative. To ensure that even more effective pollution control concepts continue to emerge as candidates for future clean coal competitions, we are also requesting $22.0 million for research into even cleaner and more affordable innovations for existing plants.

Several of the recently-selected Clean Coal projects also help expand the menu of options for meeting the President's climate change goal of an 18 percent reduction in greenhouse gas intensity (carbon equivalent per GDP) by 2012, primarily by boosting the efficiencies of power plants (meaning that less fuel is needed to generate electricity with a corresponding reduction in greenhouse gases). To position even more advanced, high efficiency power generating concepts for future development and testing, we are requesting $64.0 million to continue research into integrated gasification-combined cycle and a companion effort in high-performance, multi-fuel-capable turbines. A key aspect of these advanced power concepts—which will make up key modules of our "Vision 21" emission-free power plant of the future—is that they emit carbon dioxide in a way that makes the greenhouse gas easier to capture.

Carbon management will become an increasingly important element of our coal research program. Carbon sequestration—the capture and permanent storage of carbon dioxide—has emerged as one of our highest priorities in the Fossil Energy research program—a priority reflected in the proposed budget increase to $62.0 million in fiscal year 2004 from a fiscal year 2003 appropriated level of $39.9 million.

Carbon sequestration, if it can be proven practical, safe, and affordable, can dramatically enhance our long-term response to climate change concerns. It could offer the United States and other nations one approach for reducing greenhouse gases that would not necessitate changes in the way we produce, deliver, or use energy.

Beginning in fiscal year 2004, one of the cornerstones of our carbon sequestration program will be a national network of regional partnerships. This Secretarial initiative, which I announced in November, will bring together the Federal Government, state agencies, universities, and private industry to begin determining which options for capturing and storing greenhouse gases are most practicable for specific areas of the country. We hope to start at least five of these partnerships in fiscal year 2004.

Our sequestration budget also includes support for the President's National Climate Change Technology Initiative Competitive Solicitation program. Funding from the Fossil Energy program will be combined with funding from the Office of Nuclear Energy, Science and Technology and the Office of Energy Efficiency and Renewable Energy to competitively fund technology R&D with the greatest potential to reduce, avoid, or sequester gas emissions.

Another aspect of the President's Coal Research Initiative is the production of clean fuels from coal. Hydrogen has emerged as a major priority within the Administration and the Department of Energy as a clean fuel for tomorrow's advanced power technologies (such as fuel cells) and for future transportation systems. Within the Fossil Energy program, we have allocated $5.0 million for research into new methods for making hydrogen from coal.

To provide fundamental scientific knowledge that benefits all of our coal technology efforts, our fiscal year 2004 Budget also includes $37.5 million for advanced research in such areas as materials, coal utilization science, analytical efforts, and support for coal research at universities (including historically black and other minority institutions).

Other Power Systems Research and Development.—We are also proposing $47.0 million for continued development of fuel cells with an emphasis on lower-cost technologies that can contribute to both Clear Skies emission reductions, particularly in

distributed generation applications, and Climate Change goals by providing an ultra-high efficiency electricity-generating component for tomorrow's power plants. Distributed power systems, such as fuel cells, also can contribute to the overall reliability of electricity supplies in the United States and help strengthen the security of our energy infrastructure.

Natural Gas Research.—The President's Clear Skies Initiative also provides the rationale for much of the Department's $26.6 million budget request for natural gas research. Clear Skies legislation is likely to further increase demand for this clean-burning fuel; even in the absence of new environmental requirements, natural gas use in the United States is likely to increase by 50 percent by 2020.

Our natural gas research program, therefore, is directed primarily at providing new tools and technologies that producers can use to diversify future supplies of gas. Emphasis will be increased on research that can improve access to onshore public lands, especially in the Rocky Mountain region where much of our undiscovered gas resource is located. A particularly important aspect of this research will be to develop innovative ways to recover this resource while continuing to protect the environmental quality of these areas.

We also plan to establish a new industry-led, university consortia-based program to develop breakthrough technologies that can help assure a continued supply of affordable natural gas beyond 2015. The focus of this program will be on projects that could revolutionize the way natural gas is supplied in the United States—a focus that is well beyond the type of research industry is now doing.

Natural gas storage will also assume increasing significance in the United States as more and more power plants require consistent, year-round supplies of natural gas. Toward this end, we will initiate a nationwide, industry-led consortium that will examine ways to improve the reliability and efficiency of our Nation's gas storage system and explore opportunities for LNG facility sitting.

The most significant change in our Natural Gas Research program is the new work we are proposing in hydrogen. In keeping with our energy security goal of finding alternatives to traditional transportation fuels, we are proposing to spend $6.6 million to study innovative methods to produce hydrogen from natural gas. We will ask industry, academia, and our national laboratories to submit new ideas on hydrogen production and related research. Since the byproduct of gas-to-hydrogen processes will likely be carbon dioxide, this effort will also include research on ways to capture this greenhouse gas. This work will be closely coordinated with other efforts in the Office of Fossil Energy to capture and sequester carbon dioxide.

Over the long-term, the production of natural gas from hydrates could have major energy security implications. Hydrates—gas-bearing, ice-like formations in Alaska and offshore—contain more energy than all other fossil energy resources. Hydrate production, if it can be proved technically and economically feasible, has the potential to shift the world energy balance away from insecure sources of supply. Understanding hydrates can also improve our knowledge of the science of greenhouse gases and possibly offer future mechanisms for sequestering carbon dioxide. For these reasons, we are continuing a research program to study gas hydrates with a proposed funding level of $3.5 million.

Oil Technology Development.—The President's National Energy Plan calls attention to the continued need to strengthen our Nation's energy security by promoting enhanced oil (and gas) recovery and improving oil (and gas) exploration technology through continued partnerships with public and private entities.

At the same time, however, we recognize that if the Federal oil technology R&D program is to produce beneficial results, it must be more tightly focused than in prior years. Consequently, our fiscal year 2004 Budget request of $15.0 million reflects a reorientation of the program toward those areas where there is clearly a national benefit rather than solely a corporate benefit.

One example is the use of carbon dioxide (CO_2) injection to enhance the recovery of oil from existing fields. CO_2 injection is a proven enhanced oil recovery practice that prolongs the life of some mature fields, but the private sector has not applied this technique to its fullest potential due to insufficient supplies of economical CO_2. A key Federal role to be carried out in our proposed fiscal year 2004 program will be to facilitate the greater use of this oil recovery process by integrating it with CO_2 captured and delivered from fossil fuel power plants.

We will also refocus much of our Oil Technology program on a new Domestic Resource Conservation effort that will target partnerships with industry and universities to sustain access to marginal wells and reservoirs. These aging fields account for 40 percent of our domestic production, yet contain billions of barrels of oil that might still be recovered with ever-improving technology. A high priority effort in fiscal year 2004 will be to develop "micro-hole" technology. Rather than developing just another new drilling tool, the Federal program will integrate "smart" drilling sys-

tems, advanced imaging, and enhanced recovery technologies into a complete exploration and production system. Micro-hole systems may offer one of our best opportunities for keeping marginal fields active because the smaller-diameter wells can significantly reduce exploration costs and make new drilling between existing wells ("infill" drilling) more affordable. Using breakthrough technology like this to keep marginal fields in production preserves the opportunity to eventually apply even more advanced innovations that could recover even larger quantities of domestic crude that traditional oil recovery methods currently leave behind.

Other Fossil Energy R&D.—Our budget also includes $124.3 million for other activities in our Fossil Energy program, including $92.8 million for headquarters and field office salaries, $3.0 million for plant and capital improvements, $9.7 million for environmental restoration, $6.0 million for Federal matching funds for cooperative research and development projects at the University of North Dakota and the Western Research Institute, $2.8 million for electricity and natural gas import/export responsibilities, and $10.0 million for advanced metallurgical research at our Albany Research Center. The increase in funding at the Albany Center (up from $6.0 million in fiscal year 2003) reflects the Center's growing role in developing better materials for fuel cells and in studying new mineral carbonation concepts for carbon sequestration.

PETROLEUM RESERVES

The Strategic Petroleum Reserve and Northeast Home Heating Oil Reserve are key elements of our Nation's energy security. Both serve as response tools for the President to use to protect U.S. citizens from disruptions in commercial energy supplies.

Strategic Petroleum Reserve.—The President has directed us to fill the Strategic Petroleum Reserve to its full 700 million barrel capacity. The mechanism for doing this—a cooperative effort with the Minerals Management Service to exchange royalty oil from Federal leases in the Gulf of Mexico—is working well. We have been able to accelerate fill from an average of 60,000 barrels per day at the start of the President's initiative to a planned rate of 130,000 barrels per day for deliveries beginning this month.

Because of the President's "royalty in kind" initiative, we have achieved the Reserve's highest inventory level ever, now at 600 million barrels. Our goal remains to have a full inventory of 700 million barrels by the end of calendar year 2005.

Our fiscal year 2004 Budget for the SPR is $175.1 million, all of which is now in our facilities development and operations account. We do not require additional funds in the oil acquisition account because charges for transporting "royalty in kind" oil to the SPR are now the responsibility of the oil supplier. Also, because we have the authority to "borrow" funds from other Departmental accounts to support an emergency SPR drawdown, we no longer require the same amount of standby funding in this account. This has allowed us to use $5.0 million in funds previously appropriated for this purpose to support a portion of our fiscal year 2004 Fossil Energy R&D budget request.

Northeast Home Heating Oil Reserve.—We are requesting $5.0 million for the Northeast Home Heating Oil Reserve, a decrease of $1.0 million from the fiscal year 2003 appropriated level. The decrease reflects cost savings realized from recompeting our commercial storage contracts. The 2-million-barrel reserve remains ready to respond to a Presidential order should there be a severe fuel oil supply disruption in the Northeast. A key element of this readiness is a new online computerized "auction" system that we implemented during the last year to expedite the bidding process. Installing and testing the electronic system (including tests with prospective commercial bidders) has been a major element of the Office of Fossil Energy's role in implementing the "e-government" initiatives in the President's management agenda.

Naval Petroleum and Oil Shale Reserves.—The fiscal year 2004 Budget request of $16.5 million is a decrease of $1.2 million from the fiscal year 2003 appropriated level. The Rocky Mountain Oilfield Testing Center (RMOTC), established at the Naval Petroleum Reserve No. 3 in Wyoming, will be closed, resulting in a $3 million per year cost savings. RMOTC is more appropriately a private sector activity. We also intend to transfer the Naval Petroleum Reserve No. 2 in California to the Department of the Interior by the end of fiscal year 2003, although the transition and certain environmental compliance activities will continue into fiscal year 2004. We further expect to be able to reduce our funding requirements for equity redetermination studies for the Government's portion of the Elk Hills Naval Petroleum Reserve No. 1, which was divested in 1998. Of the four producing zones for which final eq-

uity shares had to be finalized, three have been completed; the fourth (the Shallow Oil Zone) is expected to be finished in fiscal year 2005.

ENERGY CONSERVATION BUDGET REQUEST

For our Interior appropriation funded programs in fiscal year 2004, we are requesting $875.8 million, $16.0 million less than appropriated in fiscal year 2003. The decrease reflects a shift in priorities among activities supported by the different appropriations, consistent with the Administration's R&D investment criteria and PART results, as I will describe through my testimony.

Mr. Chairman, our fiscal year 2004 Budget reflects the new organization within EERE. Two years ago, EERE was divided into 31 programs, in 17 offices, stovepiped into 5 market sectors. There were multiple overlapping layers of management and duplicative and inconsistent business systems that generated significant inefficiencies and made it difficult to ensure accountability.

In response to the President's Management Agenda, we launched a dramatic restructuring of the EERE program in April 2002. This restructuring eliminated the 5 market sectors and 17 offices, streamlined 31 programs into 11, eliminated up to four management levels, and centralized administration functions into a single support organization with a focus on developing consistent, uniform, and efficient business practices. This is the most dramatic restructuring of EERE in at least 12 years and arguably in its history.

The restructuring combined all the hydrogen and fuel cell activities, formerly scattered across 2 market sectors and 3 programs, into a single program for greater efficiency and synergy. It also combined all the bioenergy-related activities, formerly scattered across 3 market sectors and 3 programs, into a single program focused on advanced biorefineries.

The fiscal year 2004 Budget is fully aligned with EERE's new management structure and strategic goals and together they will provide greater synergy and increased efficiency and productivity in the R&D and deployment activities lead by EERE.

EERE's R&D and technology deployment efforts supported by the fiscal year 2004 Budget will provide Americans with greater freedom of choice of technology, while providing increased energy security, and reducing financial costs and impacts on the environment.

Mr. Chairman, the Energy Conservation budget request has been developed with these challenges and opportunities in mind.

FreedomCAR and Vehicle Technologies.—The FreedomCAR and Vehicle Technologies (FCVT) Program is developing more energy efficient and environmentally friendly highway transportation technologies to help reduce United States petroleum consumption. The long-term aim of the program is to develop "leap frog" technologies such as hydrogen-fueled vehicles to provide Americans with freedom of mobility along with energy security, lower costs, and lower environmental impacts. Program activities include research, development, demonstration, testing, technology validation, technology transfer, and education that could achieve significant improvements in vehicle fuel efficiency and displacement of oil by other fuels which ultimately can be domestically produced in a clean and cost-competitive manner.

In fiscal year 2004, the Department is requesting $157.6 million, a decrease of $19.7 million below the fiscal year 2003 appropriated level for the FreedomCAR and Vehicle Technologies program. The FreedomCAR portion of the budget is $91.1 million, an increase of $5.5 million above the fiscal year 2003 appropriated level. All funding for transportation fuel cell and hydrogen infrastructure activities is included in the Hydrogen, Fuel Cells, and Infrastructure Technologies program to accelerate RD&D activities to support both the FreedomCAR partnership and President's new Hydrogen Fuel Initiative.

Fuel Cell Technologies.—In fiscal year 2004, we are requesting $77.5 million, an increase of $22.4 million above the fiscal year 2003 appropriated level for Fuel Cell Technologies from Interior Appropriations. The fiscal year 2004 Budget supports fuel cell cost reduction and initiation of a fuel cell vehicle test and evaluation program.

Americans currently depend on foreign sources for 55 percent of our oil-a dependence that is projected to rise to 68 percent by 2025. Since two thirds of the oil we consume is used for transportation, we must focus on alternative means of fueling transportation from domestic resources if we ever expect to reverse this trend.

Hydrogen fuel cell vehicles require no petroleum-based fuels and emit no pollutants or carbon dioxide. Their development and commercial success would remove personal transportation as an environmental issue and substantially reduce our dependence on foreign oil

The hydrogen needed to fuel these vehicles is domestically available in abundant quantities as a component of natural gas, coal, biomass, and even water through electrolysis using renewable or nuclear power. The challenge is to economically produce, deliver, store, and distribute hydrogen for use as a consumer fuel, and to engage the broader oil, energy, and power companies in this effort. To meet this challenge, the President's fiscal year 2004 Budget proposes a new Hydrogen Fuel Initiative, a $1.2 billion effort over five years, which will accelerate research and development activities to solve technical challenges in hydrogen production, delivery, storage, and distribution. When the vision of the President's Fuel Initiative is achieved, hydrogen will power the fuel cells that provide energy for our cars, trucks, homes, schools, and businesses.

To support FreedomCAR and the Hydrogen Fuel Initiative, we need to make significant research and development investments to develop vehicles powered by hydrogen fuel cells and the infrastructure to support them. The government will be to help fund and coordinate the high-risk R&D work of numerous private sector partners and our National network of science laboratories. Government coordination of this undertaking will help resolve one of the difficulties associated with development of a commercially viable hydrogen fuel cell vehicle: the "chicken and egg" question. Which comes first, the fuel cell vehicle or the hydrogen production and delivery-refueling infrastructure to support it? The President's Hydrogen Fuel Initiative, in conjunction with the FreedomCAR partnership, answers the question by proposing to develop both in parallel; that is, to augment the already significant investments in vehicle technologies with new investments in hydrogen and fuel cell technologies. By so doing, Federal investments can help advance commercialization of hydrogen fuel cell vehicles and infrastructure by 15 years, from 2030 to 2015.

These efforts will enable the development of hydrogen fuel cell vehicles for the showroom floor by 2020. Success of these programs will begin to eliminate the need for imported oil, while simultaneously reducing emissions and greenhouse gases from America's transportation fleet without affecting the freedom of personal mobility we demand.

Weatherization and Intergovernmental Activities.—In fiscal year 2004, we are requesting $357.0 million for Weatherization & Intergovernmental Activities, $42.5 million more than appropriated in fiscal year 2003.

The Weatherization and Intergovernmental Program activities support the President's National Energy Policy recommendations for rapid deployment of clean energy technologies and energy efficient products. The program's funding request also supports the President's commitment to increase funding by $1.4 billion over 10 years for the Weatherization Assistance Program, which improves the energy efficiency of dwellings occupied by low-income Americans.

Our Weatherization Assistance Program request ($288.2 million, $64.7 million above the fiscal year 2003 appropriated level), supports weatherization of approximately 126,000 low-income homes. Based on historical data, the program anticipates that low-income families will save $1.80 in energy costs for every dollar invested over the life of the efficiency improvements. The Weatherization Assistance Program was assessed using the Administration's PART and was rated Moderately Effective.

Our fiscal year 2004 request for other subprogram activities within the Weatherization and Intergovernmental Program are as follows: State Energy Program Grants ($38.8 million, $5.9 million less than appropriated in fiscal year 2003), State Energy Activities ($2.4 million, $3.0 million less than appropriated in fiscal year 2003), and Gateway Deployment ($27.6 million, $13.3 million less than appropriated in fiscal year 2003). Within Gateway Development, there are several program shifts. For example, to avoid duplication of efforts, funding for International Market Development activities is now requested within the International Renewable Energy Program in the Energy and Water appropriation. The National Industrial Competitiveness through Energy, Environment, and Economics (NICE3) activity is terminated because the activities are within industry's capability and do not match up well against the Administration's R&D investment criteria. Other activities are being refocused to ensure program performance can be meaningfully evaluated.

Building Technologies.—EERE's buildings technology R&D programs address technologies, techniques and tools to make residential and commercial buildings, both in existing structures and new construction, more energy efficient, productive and affordable. Strategies include system R&D to reduce overall residential and commercial building energy use, R&D focused on energy end uses such as water heating, food refrigeration, and clothes washing, and the development of building energy efficiency codes and national equipment energy efficiency standards. The Buildings program was assessed using the PART and was rated Adequate. Recommendations included refocusing R&D funding on long-term, high-risk, potentially high-payoff activities; evaluating potential duplication of Building program activities

funded via the Energy and Water appropriation; and developing better performance measures. The request begins to address these recommendations.

Our fiscal year 2004 Budget for the Interior-funded portion of the Building Technologies program is $52.6 million, $6.8 million less than appropriated in fiscal year 2003. The funding supports a portfolio of activities that includes solid-state lighting, energy efficiency improvement of other building components and equipment, and their effective integration using whole-building-system-design techniques, as well as the development of codes and standards.

Emerging Technologies R&D.—In fiscal year 2004, we are requesting $21.8 million to conduct building components and equipment R&D. This amount is $9.4 million below the fiscal year 2003 appropriated level. The request reflects a redirection of near-term, low risk R&D in space conditioning and appliances to longer-term, higher-risk activities with a greater potential public benefits. For example, we are proposing a $5 million investment to expand our Solid State Lighting research activities. Solid State Lighting represents a promising, new approach to efficient lighting systems. Our Solid State Lighting research will create the technical foundation to revolutionize the energy efficiency, appearance, visual comfort, and quality of lighting products by achieving efficiencies upwards of 70 percent (source efficiency).

Residential Buildings and Zero Energy Buildings R&D.—The fiscal year 2004 Budget is $15.2 million, an increase of $2.9 million from the fiscal year 2003 appropriated level. The Department will pursue systems research on five promising technology areas, enhance activities to apply practices and approaches developed through Building America to existing residential buildings.

Equipment Standards and Analysis Program.—We are requesting $9.0 million, compared with $9.6 million in our fiscal year 2003 appropriated level. The Department will continue the development of equipment test procedures and standards. We will be completing analyses that will add new products to the lighting and appliance standards program.

Industrial Technologies.—The Industrial Technologies program partners with energy-intensive industries to develop and apply advanced technologies and practices that reduce industry's energy consumption and improve environmental performance. In fiscal year 2004, we are requesting $24.0 million, compared with the $62.1 million appropriated in fiscal year 2003, for the Industries of the Future (IOF) (Specific) programmatic area. The request reflects a determination that the program supports some activities for which the private sector has sufficient incentive to pursue without Federal support. The Department has re-focused its R&D efforts to higher priority technologies within the EERE portfolio, including hydrogen and advanced fuel cell technologies. The activities that continue in the IOF (Specific) programmatic area will focus on bringing existing projects to successful commercialization and pursuing longer-term, higher-risk activities with significant potential public benefits that industry would not undertake alone. We are also requesting $34.4 million, $2.1 less than appropriated in fiscal year 2003, for the IOF (Crosscutting) programmatic area, which includes Industrial Materials of the Future ($13.6 million); High Efficiency Combustion Systems ($2.0 million); Sensors and Control Technology ($3.8 million); and Industrial Technical Assistance ($14.8 million).

Biomass.—For the first time we have brought a diverse industry together and produced a vision and R&D roadmap that has increased the level of industry investment. This roadmap has allowed us to begin the process of rebuilding the program and focusing on the most promising long-term opportunities for these technologies. We have improved our collaboration with other Federal agencies, especially the Department of Agriculture (USDA). In addition, the Farm Bill provided direction and mandatory funding to USDA to work with DOE in advancing biomass technologies. Our fiscal year 2004 request for Interior-funded portion of the biomass program is $8.8 million, compared with $24.6 million appropriated in fiscal year 2003. The request supports continuing R&D on the thermochemical and bioconversion process, and evaluating opportunities for the production of fuels and chemicals from intermediates ("platforms") such as sugars from biomass and starch crops, synthesis gas from biomass gasification, and biomass oils. The request terminates black liquor gasification activities, which do not align well with the R&D investment criteria, as sufficient incentive exists for industry to pursue these activities alone.

EERE bioenergy activities were integrated into one office to help focus resources on a limited and more coherent set of goals and objectives, increasing collaboration with industry, reducing overhead expenses, and exploiting synergies among similar activities in support of a future biorefinery industry. This focus on a clear set of goals, substantial leveraging of research funding with industry, and the transfer to industry of a number of demonstration activities that industry should continue to pursue without federal support is reflected in our request.

Power.—Our Distributed Energy Resources Program leads a national effort to develop a flexible, smart, and secure energy system by integrating clean and efficient distributed energy technologies complementing the existing grid infrastructure. The program is supporting regional and state strategies to ensure electricity and reliability. By producing electricity where it is used, distributed energy technologies can increase grid asset utilization and reduce the need for upgrading some transmission and distribution lines. Also, because distributed generators are located near the point of use, they allow for the capture of the waste heat produced by fuel combustion through combined heat and power (CHP) systems. In fiscal year 2004, we are requesting $51.8 million, compared with $61.1 million appropriated in fiscal year 2003. The program is following an RD&D model, similar to Advanced Turbine Systems subprogram, completed in fiscal year 1999, in pursuing activities in microturbines, reciprocating engines, thermally activated devices and other areas. The program expects to meet the performance milestones for efficiency, environmental emissions and cost effectiveness for microturbines and reciprocating engines through cost-shared RD&D and down selecting among several different approaches.

Federal Sector.—The Federal Government is the Nation's single largest energy consumer. It uses almost one quadrillion British thermal units (Btu) of energy annually, or about 1 percent of the Nation's energy use. In fiscal year 2000, the Federal Government spent about $4 billion in energy to heat, cool, light, and conduct operations in 500,000 buildings. Simply by using existing energy efficiency and renewable energy technologies and techniques, the Federal Government can begin to lead the Nation toward becoming a cleaner, more efficient energy consumer. In fiscal year 2004, we are requesting $20.0 million for the Federal Energy Management Program to continue meeting the goals of reducing Federal energy consumption.

Program Management.—The Energy Conservation Program Management budget component provides executive and technical direction, information, analysis, and oversight required for efficient and productive implementation of those programs funded by Energy Conservation appropriations in EERE. In addition, Program Management supports all Headquarters staff, six Regional Offices, the Golden Field Office in Colorado and several DOE employees at three Operations Offices to plan and implement EERE activities as well as facilitate delivery of applied R&D and grant programs to federal, regional, State, and local customers. In fiscal year 2004, we are requesting $76.7 million for these activities, which is fairly level with the fiscal year 2003 appropriated level.

ENERGY INFORMATION ADMINISTRATION BUDGET REQUEST

For the Energy Information Administration (EIA), we are requesting $80.1 million, the same level as appropriated in fiscal year 2003. The requested funding will be used for ongoing data and analysis activities and critical data quality enhancements, so EIA can continue to disseminate accurate and reliable energy information and analyses to inform energy policy-makers. EIA's base program includes the maintenance of a comprehensive energy database, the dissemination of energy data and analyses to a wide variety of customers in the public and private sectors through the National Energy Information Center, and the maintenance of modeling systems for both near- and mid-term energy market analysis and forecasting.

In fiscal year 2004, EIA's priority is to maintain high-quality core energy data programs and forecasting systems needed to provide timely data, analysis, and forecasts. EIA will complete the update and overhaul of its consumption surveys. EIA will continue to overhaul the electricity surveys and data systems to accommodate changes in the deregulated energy industry and improve data quality and accuracy in the petroleum, natural gas, and electricity areas.

EIA continues to aggressively expand the availability of electronic information and upgrade energy data dissemination, particularly on the EIA Web site. The increased use of electronic technology for energy data dissemination has led to an explosive growth in the number of its data customers and the breadth of their interests, as well as an increase in the depth of the information distributed. During fiscal year 1997, EIA established a goal to increase the number of users of its Web site by 20 percent annually. In each of the succeeding years EIA has managed to either meet or exceed this commitment, with a 39 percent increase in fiscal year 2002 while delivering more than 2,400 gigabytes of information.

EIA also has increased dramatically the distribution of its information by becoming the dependable source of objective energy information for the news media. By using this distribution channel EIA has ensured its energy data to be widely seen and used by the general public at minimal additional cost to the Federal Government.

In May 2002, on short notice, and with no new budget resources, EIA, at my direction, began operation of a new weekly survey of natural gas in underground storage after the American Gas Association stopped operation of its weekly survey. This survey is the Nation's only weekly gas supply data and is crucial to decisions of supply planners in industry and utilities as well as to analysts assessing the current natural gas supply and demand situation, especially prior to the winter heating season.

EIA culminated a three-year effort to revise its electric power data collection forms with a new set of surveys. The new surveys will collect information necessary to understand and evaluate many of the changes that have occurred in the electric power industry due to restructuring and retail competition by collecting additional information from the growing percentage of nonutility generators. EIA added to its E-Government initiatives by incorporating Internet data collection with this set of surveys.

In the area of improving data quality, EIA has reprocessed twelve years of electricity data from nonutility generators and has revised its Annual Energy Review to present this data according to industry conventions, moving nonutility power producers' consumption from the industrial sector to the electric power sector. The revised data uses natural gas consumption supplied by nonutility electric generators in place of natural gas pipeline deliveries, providing a better representation of natural gas consumption. These revisions will be extended to other EIA publications this year.

With increasing frequency, EIA has been requested by the Administration and Congress to produce comprehensive service reports that analyze current energy issues of major importance. The number and sophistication of these analytical requests have grown, often requiring EIA to postpone work on vital quality assurance activities, and requiring negotiation with the requestor on delivery dates and the scope of the study and final report. As in past years, EIA fulfilled several requests for special studies and investigations for the Administration and Congress. During fiscal year 2002, EIA expended nearly $2 million in resources to complete the 93 special reports and analyses during the fiscal year. In particular, EIA was asked by several Members of Congress to evaluate the impact of several provisions of the proposed House and Senate Energy Bills on energy demand, supply, prices, and on the economy. These analyses were often referred to Congressional floor debates and many were cited in revision to the proposed Senate bill. If this level of demand continues, EIA is expected to exceed $2 million in fiscal year 2004 to fulfill these requests for analyses and reports on topical energy issues.

Mr. Chairman, and Members of the Subcommittee, this concludes my prepared statement. I would be happy to answer any questions you may have at this time.

Senator BURNS. Thank you, Mr. Secretary. We have been joined by the ranking member, and former chairman of the full committee, Senator Byrd this morning. Senator Byrd, if you have a statement, we would entertain that at this time.

OPENING STATEMENT OF SENATOR ROBERT C. BYRD

Senator BYRD. Mr. Chairman, thank you very much, and thank you, Mr. Secretary. Thank you, Mr. Chairman, for holding this hearing today so that the members of this subcommittee have an opportunity to review and discuss the administration's fiscal year 2004 budget request for the Office of Fossil Energy, the Office of Energy Efficiency, the Energy Information Agency, and the Strategic Petroleum Reserve. I appreciate your willingness to ensure the Secretary's appearance this morning. He's kind of hard to get hold of, but you brought him in. You are from the west, and when you go after them, you get them, right?

Senator BURNS. I wish I could say that about my fishing.

Senator BYRD. Much of the $1.7 billion appropriated to the Energy Department through the Interior bill is directed towards research and development activities. These programs, particularly the fossil energy programs, are the linchpin to ensuring our Nation's energy security. Mr. Chairman, 52 percent of the electricity

generated in this country comes from a coal-fired power plant, and close to 100 percent of our transportation comes from oil and natural gas. Obviously, the importance of fossil fuels to our national and economic security cannot be overstated.

Yet despite those facts and contrary to all the rhetoric that we hear coming from this administration, what is being proposed for the Office of Fossil Energy is simply disastrous. This budget cuts coal research 10 percent below the fiscal year 2003 enacted level. It cuts natural gas research and development by 43 percent. It cuts oil research and development by 64 percent. And it would put 150 of the brightest fossil energy scientists out of work at the very moment we should be redoubling our efforts to find resources in an environmentally sound manner.

Mr. Chairman, I look forward to working with you throughout the appropriations process to see what can be done to rectify these shortsighted and negative proposals. I know that resources will be particularly tight for fiscal year 2004, but this budget request cannot be adopted in its present form without doing serious damage to our Nation's energy security efforts. I would urge you and all the members of the subcommittee to resist going down that path.

Thank you, Mr. Chairman.

Senator BURNS. Thank you, Senator.

We discussed this when the Secretary was in my office, and we're going to find a way to get the job done the way it should be done. I'm always amazed at the mindset of some folks. The majority of our oil and gas is found on public lands. Yet, we vote every day to take those lands and those areas where that resource is found completely off the board when it comes time to inventory what we have in the event that we need them. So this thinking on oil and gas runs counter to some ideas here on the Hill of what we should be using.

We spend a lot of money every year on the Strategic Petroleum Reserve, and send millions of barrels of oil down there, we simply buy it and put it in the ground. That's a cost to the taxpayer. The taxpayer is paying nothing for the natural reserves that we find on some of our outer continental shelf and our public lands. It is already there because Mother Nature stores it, but we are denied the right to inventory it and recover it, if it has to be recovered.

About 2 weeks ago we had the opportunity to drive the fuel cell automobiles that General Motors had out here. I will tell you that looking at the numbers, and looking at the work that's being done, we are closer to a hydrogen society than we think we are. The work that's being done in hydrogen fuel cells is starting to see some results. So I'm very encouraged about that. Also the Secretary and I think there is a great possibility with Future-Gen.

We have tons and tons of coal, and we should not back off in working on the technology to make it more feasible, to make it more acceptable to the environment, and to look at this great product we have because it is a source of the cheapest power that we produce today other than hydro. Hydro is the only one that can come close to that. So, Mr. Secretary, we talked a little bit about Future-Gen and its proposals, we look forward to working with you on that, and of course we also have some very distinct ideas on

where it should be located, but nonetheless I think it is a bold step as far as our concerns.

In the area of conservation, I believe you are aware of the solid-state lighting initiative which this subcommittee supported with an appropriation of around $3 million last year. You have requested $5 million for this program and there is significant promises that lay ahead in solid-state lighting and we've been a witness to a lot of that research and development. I understand the Department has investigated and calculated these potential benefits while developing a road map for the solid-state lighting program. Would you want to share with the committee your conclusions or have you drawn any conclusions, or where are you in that particular program?

Secretary ABRAHAM. Well, I think, Mr. Chairman that the conclusions we have to this point is we believe it is possible to produce higher quality lighting using advanced solid-state technology that could produce a 70 percent improvement over the best fluorescent lighting today. We are seeking about a 21 percent increase in the lighting R&D budget from what we had submitted in 2003, in part to accommodate an increase in next-generation solid-state lighting.

So you know, I think the percentage of total electricity used in this country that's attributed to lighting is about 22 percent of all of our electricity demand level, so if we can make gains in efficiency or breakthroughs in this area, it has a much broader application than a lot of the other things in which we do research. So I think we are exploring creating a more formal public/private kind of partnership and try to focus more on this issue. And I know that in the energy bill, this has come up as an area in which the Congress will want to take a lead in setting out a formalized process for this and it is an area where real potential exists.

Senator BURNS. For the information of the committee, we are talking about the use of fiber optics for the purpose of lighting. Senator, this can even be done through your drapes. They can change the tone of light and the amount of light. The folks who work what they call the midnight shift now, but in your day we worked graveyard, if you remember.

Senator BYRD. The hoot owl.

Senator BURNS. The hoot owls. They can now make lighting in a plant to simulate a morning light, noon light, and an afternoon light, even though it's dark outside. It's a marvelous breakthrough. There is a consortium of manufacturers who have come together to support this lighting initiative. It's just like the Secretary says, when you talk about the possibility of a 70 percent savings in lighting costs alone in this country, you're talking about a big chunk of conservation. I really hope that the Department of Energy will take a closer look.

According to the budget justification, a rather small off-highway vehicle R&D program is being terminated because other research opportunities have higher impact on energy savings. In looking at the Department's own R&D road map off-highway, however, I find that off-highway uses account for 20 percent of the fuel used in the transportation sector. That is a huge amount and I don't think there are a lot of people that understand how much off-highway fuel is used in this country. Can you reconcile these figures with

the energy use and the emissions with your decision to terminate a $3.5 million program?

OFF-HIGHWAY VEHICLE R&D PROGRAM TERMINATION

Secretary ABRAHAM. As I understand, the principal focus of the work that has been done has been related to railroad applications, and I think in that area the amount of actual demand or the use of oil is pretty small compared to the daily total consumption of the country, which is about a quarter-million barrels a day out of 12 million barrels a day of imports alone. So in terms of the priority somebody has to set when somebody sets a budget, we looked at that percentage versus the percentage that goes to the rest of the transportation sector and made the judgment that even if we were highly successful in the improvement of R&D in this area that it wouldn't have in terms of application that big of an effect, and I think that's the basis of that conclusion that you read.

GASOLINE PRICES

Senator BURNS. I think even though we're going into the vacation season gasoline prices are on everybody's mind. We saw the spike in February, and it's settled down to around $27 or $28 a barrel now. They tell me the domestic supplies are lower, our domestic production keeps going down. OPEC made an announcement the other day that they were going to watch their supplies. Can you give us an update on these fluctuating oil prices? And have you drawn any conclusions about what we should be doing about them?

Secretary ABRAHAM. Let me talk about the sense of the market for a minute and then what we should be doing. On the market itself, there is no question that we went through a period here over the last 4 or 5 months that was sort of the perfect storm in terms of problems. Just an incredible combination of events happened in a very short period of time. One of them was the strike in Venezuela, which took about 3 million barrels of production out for a very long time, and much of the Venezuelan oil comes to the United States, that's one of our major supply sources. We also had a cold winter which made the demand go up during the winter heating season. We had in Nigeria a period of civil unrest that threatened some of the employees that worked in the oil sector there and they pulled people out of the fields and caused production in Nigeria to drop for a period. And we had the period leading up to the war in Iraq, we had the war, and since its beginning of course and even today, the production from Iraq was essentially halted. So this was a pretty amazing period of events.

In one sense we saw some spikes in the market and you referred to them, we saw the market go from the mid-20s to even a little bit higher, to spike up into the high–30s for a brief period of time right before the war, I think the top limit it hit was $39.99 a barrel. And it has now come down and is stabilizing in the mid-to high–20 range. We would like probably less of that, to see, you know, obviously less of that volatility.

On the other hand, if you compare this period to three similar periods in which a lot of international crises were taking place, from the last 30 years, the spike was substantially lower. In 1973 during the oil embargo that took place, prices spiked four-fold. In

the 1979–80 period during the revolution in Iran, prices more than doubled. From the Persian Gulf War in 1990, 1991, prices doubled. But here they went up for a shorter period of time and by a much smaller amount.

As a consequence, we have seen gasoline prices, the projection for gasoline prices for the summer based on our energy administration reduced substantially. At one point we were pointing to a summer-long average of almost $1.70 a gallon, and now it's $1.46 a gallon. We would like to see gasoline prices lower than that, but that's comparable or lower than two of the last three seasons, so in that sense we are a little more optimistic today than we would have been just 1 or 2 months ago.

What we would like to do in the long term is much more important, and I think the subcommittee cares how we address this. One, the chairman has talked about with me and talked publicly at some length about the need to diversify our international source of supply.

Senator Byrd makes a good point. We will try to get our national labs focused on this challenge.

So to complete the thought I was on before, Senator, the issue you have raised on a number of occasions about the diversification of where we have energy partnerships is important and Russia is one area I know you're interested in, and is one focus of our attention as well. Last year we hosted a summit between Russian energy companies and American energy companies, tried to bring them together to create an opportunity for people to become familiar with new project opportunities in Russia and the Caspian region generally. There is a lot of infrastructure that needs to be built in order for those resources to become available to the world market, but we see that as an opportunity. We see in Africa as well as our own hemisphere areas where greater production is possible. That's one part of the solution.

A second part of the solution is the need to proceed producing more here at home, and the debate the Senate last had on the war and other production issues is critical to that.

Finally, we try to look ahead, how can we reduce our dependence on foreign oil, and that's really the reason that the hydrogen proposal that we're talking about this morning, we see it as a way to address both the dependence on imports on the one hand and the environmental issues that relate to internal combustion engines on the other. And we are very confident that the research we're proposing and would be carried out with Congress's support to develop not just a fuel cell operating vehicle but the infrastructure to support it has the potential by 2020 to produce the capability to literally be operated on hydrogen fuel cells. The source of the hydrogen could be domestic in nature and it would change the game completely in terms of the dependence issue on the one hand and the issue of the environmental concerns on the other.

The one thing I always point out to people is that these issues keep coming up. Every time there is a spike in energy prices, we all look for answers and then when the prices go back down it seems that the people sort of forget about it for a while and yet, the cycle continues. And whether it's a series of issues like the ones we have had this year or others, it's going to keep going in that

sort of pattern until we get past this debate if we are successful, which I think we can be on, the hydrogen fuel cell initiative.

Senator BURNS. Senator, do you have a statement? I was going to go to Senator Byrd for his questions.

OPENING STATEMENT OF SENATOR PETE V. DOMENICI

Senator DOMENICI. I have a brief statement. First, I want to thank you, Mr. Chairman, and welcome the Secretary. It's good to have you here and great to be with you again. I am interested in the President's budget for fossil energy R&D and energy conservation programs of the Department, and related programs. It has been 2 years since President Bush submitted his comprehensive energy plan, and we renewed our commitment to passing a comprehensive energy act. I look forward to Senate action on Senate bill 14, which is pending on the calendar, and I thank you for the help you gave us in preparing that bill.

I also thank Senator Byrd and his staff and others for the significant help they gave us for preparing the coal provisions of that bill, which we think are mighty powerful for America's future. I believe the programs under the jurisdiction of the Interior Subcommittee are critical to our Nation's future. The administration's proposal to develop a hydrogen-powered car through the FreedomCAR and FreedomFuel initiatives with about $1.5 billion spread over the next 5 years hold significant promise for the future and again, Senator Byrd, we will find provisions for that in Senate bill 14 as a part of a Senate and congressional policy, with some changes.

The Clean Coal Power Initiative and the Coal Research and Technology Initiative in which DOE proposes to invest $2 billion over 10 years focuses on our most abundant energy resource. Coal is necessarily part of our energy future, and we want it to be clean coal. Investments in more efficient energy technologies for industry, the building sectors, and transportation have big payoffs for the country.

Conservation is an important component of our energy security. The administration plans to double the funding for weatherization assistance over 10 years will greatly advanced this goal.

There are many good initiatives in the President's budget, and most necessarily come at the expense of our ongoing programs. You know of my concern, Mr. Secretary, over the repeat of the administration proposals to significantly reduce our investments in oil and gas technologies. These are not big programs but over a number of years they have contributed significantly to new technology by which we are discovering oil and gas underground. The budget proposes funding oil at 65 percent below the currently enacted level and gas by 44 percent below the enacted level. Those are the funding levels.

Congress has traditionally restored funding to these programs and I suspect, even though the budget is tight, that we will try again to set our priorities in these appropriations bills. It will be tough for us to provide funding for all the initiatives, but we are up to the task, and with the ranking member understanding these issues as he does, I believe somehow or another we are going to come through with a good Presidential budget being made better by this subcommittee.

So I join my colleagues in welcoming you, Mr. Secretary, and look forward to an exchange of views. Before I am finished today, I will cite a technology that's going on in a little community in New Mexico and that I'm going to invite you to come and see. When it comes to the issue of clean coal, it is truly a marvel. We can't quite get it exposed, but it's something that the world should know about. I yield.

Senator BURNS. Senator Byrd.

Senator BYRD. Thank you, Mr. Chairman, and thank you, Senator Domenici, for the good work you're doing, and you have made my statement already but I'm going to make it again, because I know the Secretary wants to hear it.

FOSSIL ENERGY RESEARCH BUDGET CUTS

Mr. Secretary, 2 years ago, the administration ignored its own campaign rhetoric and proposed an 18 percent cut in funding for fossil energy research. At that time, I remember that speech that the President made in West Virginia, and that's why you're sitting right here today. He made that speech in West Virginia, he was going to add $2 billion to fossil energy research, so here you are. But for that, and his outreach to the steelworkers in West Virginia, he wouldn't be President and you wouldn't be Secretary.

So at that time, you explained away the inconsistencies between the rhetoric and the reality by telling us that you were new to the job and that you did not have complete control of the budget. You told us just wait a year and we would see concrete evidence that the administration was truly committed to the kind of research needed to secure our national energy security.

Last year, the President's budget proposed a 16 percent cut in the fossil energy account. You told us then, with all due respect, that despite its actions, the administration was indeed devoted to fossil energy research but that the Assistant Secretary was new to his job and did not have complete control of the budget. You also said that he was undertaking a top-to-bottom review of all fossil energy programs and that that policy review would drive future budget requests.

Now today, here comes the Secretary before us to present a budget request which again cuts fossil energy research by 16 percent overall, including 13 percent from the Clean Coal program, 44 percent from natural gas research, and 58 percent from oil research. I think these requests constitute prima facie evidence that this administration lacks a coherent and comprehensive national energy plan. I can't believe that these cuts are based on sound policy decisions. Nor do I believe that anyone can seriously argue that in a $2.2 trillion Federal budget, $600 million invested in research that will allow us to utilize our most abundant energy resources in a sound manner is too much. Thus, I question you, Mr. Secretary.

Can you point to anything in your top-to-bottom policy review that would suggest, even suggest a need for the level of cuts that this administration has proposed?

Secretary ABRAHAM. Well, let me try to preface my remarks if I could take a little additional time on this response by saying this administration absolutely is committed to and is working hard on programs that relate to maintaining the strength of coal and/or fos-

sil fuels as part of our energy mix, and there should be no misunderstanding of that.

Second, I want to also sort of talk briefly about the commitments we are making and the programs we are trying to launch.

Third, I want to put in context, although just for your consideration, the chronology of how some of these budgets have been put together.

Let me talk about the program, Senator. We obviously are demonstrating a greater level of commitment to putting the fossil fuel, and particularly the coal sector, to bring it into the 21st century and maintain it as a strong part of our energy mix. I base it on the rhetoric of people who accuse us of being far too committed to coal in the future. In fact, when we announced our hydrogen fuel vehicle program, people assailed it because they said you were going to burn dirty coal to create hydrogen.

Our position is that for coal to succeed and survive and be successful, we have to address some of these environmental concerns, and we concluded that the carbon sequestration is a key component of that long-term vision for the use of coal. That's why that program is increased by 60 percent. That's a result of the review which we conducted.

I am also convinced that we have to go beyond the laboratory and demonstrate to the world the capabilities that we have and the ability that we will have to actually operate a totally clean power plant, coal-based electricity generation facilities that sequesters 100 percent of the carbon. That's why we launched a $1 billion program in the new Future-Gen proposal which over the next decade and perhaps 10 or 12 years will be, I think the most ambitious new program in the area of fossil fuel that is being undertaken anywhere in the world. In fact, since we announced it, we have had many numerous nations contact us to ask if they can participate.

Now, you have to——

Senator BYRD. Mr. Secretary, my time is limited. You are still cutting the budget. Now, is there anything in the policy documents or in the administration's national energy policy that would convince Congress to massively scale back our national commitment to fossil energy research?

Secretary ABRAHAM. Let me apologize. I was taking extra time and I hope it won't come off Senator Byrd's time.

Senator BURNS. Nothing comes off his time.

Senator BYRD. You see what respect age brings you. I am the ancient gnome of the Capitol.

PROGRAM ASSESSMENT RATING TOOL [PART]

Secretary ABRAHAM. Let me try to focus on that specific issue. First, in determination of some specific conclusions, one of the things which was included in the process of putting this budget together was the result of a series of analyses called PART scores, that analyzed various Department of Energy programs. It was a review conducted by the Office of Management and Budget, and regrettably from our point of view, the scores with respect to our natural gas and oil technology programs deemed those programs as currently constituted ineffective. After that process, with the programs in those areas deemed to be literally ineffective in their per-

formance, not every part of them, but substantial parts of them, I did not feel I could come to this committee or the public and say we are asking for large amounts of money to support programs that have been rated as ineffective. We are in the process of reconfiguring those test programs.

Second, I would say to the committee if the chronology could be thought about, we submitted this budget before this committee and this Congress passed its budget, and now the comparison to what was the enacted level of 2003 is being used to say that we proposed big cuts. And granted, there were marks in the House and Senate at the time, but we didn't have a final budget. We are proposing in R&D for fossil energy a $40 million increase over what we proposed last year.

I would also note that we had available to us last time when we submitted our budget for our 2003 request, we had available advanced appropriations which we could include in that request. We still submitted a budget with an R&D——

FOSSIL ENERGY OMB BUDGET

Senator BYRD. Mr. Secretary, would you provide the committee with the fossil energy budget submission that your Department presented to OMB, so the committee can compare it with what the administration has requested?

Secretary ABRAHAM. I don't know if such documents are normally provided in this kind of setting and I would have to check on whether that kind of document is provided.

Senator BYRD. What I'm trying to get at is, I'm trying to get at what you really told the Office of Management and Budget—I suppose Mr. Mitch Daniels is still at the helm—what you really told OMB you needed and what, how we can compare that with what the administration requested. Perhaps then we will be in a position to make an adjustment that will help you meet your needs. And that's what the people I think want to see, they want to see careful handling of their money, but they also want to see research go forward so their children can be encouraged by the needs are that are going to confront them. Can you provide that?

Secretary ABRAHAM. Senator, I can't recall which documents we have made available or would make available. That which has been made available in the past, I will make available. I can't recall which of these sorts of submissions have ever been submitted to Congress.

Senator BYRD. I can assure you that's not the first time that question has been asked and I can also assure you that the Appropriations Committee has been provided with the answers to such questions as they have been propounded to various department heads in the past. I have been around here 50 years and this is something the committee needs to know. See what you can do and see if you can provide that for the record.

[The information follows:]

NON-RELEASE OF DEPARTMENT'S OMB BUDGET REQUEST

According to the Office of Management and Budget [OMB], the advice and counsel leading up to the recommendations that form the basis of the President's budget are part of the internal deliberative process of the executive branch. Similar to the premark up activities of any congressional committee, the initial views and positions

within the executive branch vary widely relative to the outcome in the President's budget. In order to assure the President the full benefit of advice from the agencies and departments, the administration treats these working papers, such as the Department's OMB budgets, as pre-decisional, internal documents. Therefore, the Department's OMB budget is not releasable outside of the executive branch.

Senator BYRD. Is my time up?

Senator BURNS. It is, and I would call on Senator Domenici.

CLEAN COAL

Senator DOMENICI. Mr. Secretary, I want to compliment the administration on the continuing commitment to the Clean Coal Power initiative and to the Clean Coal Power and Coal Research initiative in the 2004 budget. I believe we should capitalize on our greatest strength in coal and nuclear, in both areas and address the risk areas. I think you are handling these in the right way now and I compliment you for it.

I would like to assure you that coal initiatives will address issues associated with mining as well as the subsequent combustion process. For example, I want to cite this for you and for you, Senator Byrd. There is a small company in New Mexico in the city of Raton which has worked with a Russian institute through your Department's Initiatives for Proliferation Prevention to develop instruments that allow remarkable refinements in coal and how it is mined.

This instrument, which actually mounts itself on a drill head, enables the drill to automatically, believe it or not, leave the last few inches of the top and bottom of the coal seam in place. The majority, it happens, of all the heavy metal contaminants are in those few inches of coal. Can I repeat? The majority of the metal contaminants, which are the worse, are in those few inches. This machine goes through the mine and leaves that there, never touches it, and it's geared to it, it's instrumented to it, it's all technology. What comes out is coal that is far less contaminated. Thus, the burden of what you have to do with it to clean it is dramatically reduced.

I continue to believe that we should focus on research and development in clean coal. I like the big picture, let's produce a machine. I think the same way about nuclear, let's produce the new nuclear machine. But at the same time, there is research of this type and many like it, and I would like to call it to your attention because I believe it has some fantastic potential for America. I would hate to see it used exclusively in Russia for the next 8 or 10 years before we take a look. So I leave that with you and I will call it to your attention again, Mr. Secretary.

Secretary ABRAHAM. Thank you.

FUEL CELLS

Senator DOMENICI. On oil and gas research, I'm disappointed in the request. I told you about it, but I believe we will work together on this committee to see what we can do about it.

On fuel cells, the administration's proposed initiatives for fuel cells and hydrogen R&D have been very well received in the scientific community and in the Congress. The so-called FreedomCar and other things that go with it are excellent ideas. There is a seri-

ous question about whether that program is going to get us where we want to be fast enough, but in an economy where we don't have all the money in the world to spend, I believe for an initiative just announced to have $1.4 billion is an excellent start.

A recent report of the National Research Council raised the issue, essentially saying that in its assessment, that a number of the fuel cell demonstration projects seemed to be getting ahead of our progress on essential fuel cell R&D. Mr. Secretary, do you share my concern that we need more fundamental R&D to make progress on fuel cell technology?

Secretary ABRAHAM. Yes, we do. The challenges we have on the hydrogen fuel cell and FreedomCar initiatives are multiple. We have a challenge in bringing down the cost of the fuel cell itself. The price has come down a lot in recent years, but it still has a long way to go.

Second, we have an issue relating to storage. We have to be able to store sufficient power on the vehicle to enable the range that they think you should be able to drive, that's 300 miles, and there is research involved there. We have the production of the hydrogen, and one of the things that we are doing in this next 5-year period is to try to invest in a variety of production technologies, coal being a possible source, nuclear energy being a possible source, natural gas being a source, and renewable sources as well.

Senator DOMENICI. Just for the record, I rode around in one. How much was the cost of that one?

Secretary ABRAHAM. The rental cost is in the $10,000 range.

Senator DOMENICI. Aren't they worth more than a few million dollars each?

Secretary ABRAHAM. Yes.

Senator DOMENICI. I would expect that if they are going to each cost $10 million, we will have to vote on whether we want to make any progress or not. Let me leave that.

What is your assessment of research on liquid hydrogen, compressed gas, and carrier fuels that would transport hydrogen in vehicles?

HYDROGEN VEHICLES

Secretary ABRAHAM. At the end of the day, our belief is that some of these technologies, can work for near-term demonstrations of hydrogen vehicles. One of the major problems is that they, for example, the liquid tanks come nowhere close to meeting the volume targets, the issue I mentioned a moment ago. One of the ideas a few years ago was electric vehicles, and then people realized the distance you could drive was constrained. We recognize that for a hydrogen motor vehicle fleet to work, people have to see it as a comparable product to the product it's used to, it has to drive as far, sufficient power and size, but you have to be able to refuel and get home when you drive some place, and the storage issues are substantial for liquid tanks and compressed tanks.

Fuels like gasoline or methanol can be used, you have to have an on-board processing unit, and the processors have been reduced dramatically in size. They are expensive and complicated projects, so again, we question whether either of these routes will get you

to a vehicle comparably priced even after much development, which is why we tried to develop the fuel cell.

FUEL CELL RESEARCH AT LOS ALAMOS NATIONAL LABORATORY

Senator DOMENICI. I want to close my testimony here by making a suggestion to you. I note that the researchers at Los Alamos National Laboratory continue to make progress in fuel cell research, and I think you would concur in that statement. I think they are poised to be one of the centers of excellence in this area. I believe the Nation needs to create a center to integrate a number of the specialties to more easily develop commercially-ready fuel cell initiatives, and I think the Department ought to be thinking about a center, a focal point. I ask you to consider that and obviously in your consideration of it, if you might consider Los Alamos as a center of excellence to pursue more vigorously the various research moving efficiently towards a prototype and more ready-to-go-fuel cell.

Secretary ABRAHAM. The answer would be of course as we move through those considerations, both the question of one or more centers will be examined, and we already have I think very high regard for the work that has gone on and continues at Los Alamos in this area. What we're trying at this stage to do is to determine the road map in kind of the logistics. I think we have an excellent road map in terms of the research pathway forward. A key part of that is we really make sure that the money that's needed, I think 80 percent is the amount that we believe has to be focused on basic research with a smaller percentage, 20 percent or so in terms of demonstrations, and now that we have that pathway for it, I think how we execute the pathway is what is important.

We definitely know what the research challenges are and we hope to keep people realistic about the time frame. People think that somehow in 4 or 5 years, we can mandate or force the marketplace to move faster than it is prepared to move and I think that will undermine the success of this transformation. It took many, many years and a trillion dollars to build the petroleum infrastructure we have today and it's going to take time with respect to a hydrogen fuel infrastructure, and if you try to short-cut that, it would be counterproductive.

Senator DOMENICI. But Mr. Secretary, the objective of moving as rapidly as you can in the most efficient manner to get to a consumer-ready fuel cell system is something you must look at every day, because that may not happen by having diffuse research that's going on with everybody excited about their little business.

Secretary ABRAHAM. You are absolutely correct and there is no question that the time issue is critical in the following respect. This has always been 30 years away.

Senator DOMENICI. It's not now.

Secretary ABRAHAM. I will say this. It will be 30 years away if we don't put it on a fast track, don't fund it and don't move with the vehicles at the same time. Because as I think many of you are already well aware, which is a challenge itself, is we can't just build the car when there isn't a fuel system, or a fuel system when there is no car. We really have to move them both.

Senator DOMENICI. Thank you very much. Thank you, Mr. Chairman.

HYBRID TECHNOLOGY

Senator BURNS. I want to follow up on that. You have cut Vision 21 on the hybrids and that tells me that the production or the results of that R&D has been on the negative side. Can you bring me up to date?

Secretary ABRAHAM. In the budget we submitted, we're seeking a higher amount than we did last year for hybrid technology because we do see developments in that area as still beneficial. However, we don't believe the hybrids are the final answer, we see this as a transitional step between where we are today with a basic, you know, internal combustion engine, traditional system and the day in 20 years or so when hydrogen vehicles are available. We would like to and believe there can be an expansion of other kinds of more fuel efficient vehicles and we see hybrids as a part of that transition, which is why you will see that we are proposing a slight increase in hybrid technology.

Senator BURNS. I am concerned about all these cuts in particular areas. I don't want you to weaken your hand when it comes to interagency governmental policy. I think you have to have a strong hand about interagency on these environmental issues, because I would like to see more cooperation between the Department of Energy and Department of the Interior. Sometimes those talks break down when we talk about either stationary or transportation fuels, so I would kick that up if we could. We are going to have new people to deal with at EPA, but this is very sensitive.

I have some questions on off-shelf reserves. We talked about most of these issues privately, and I think we can deal with them. We look forward to working very closely with you as we develop this budget.

Do you have any further questions, Senator Byrd?

Senator BYRD. I do have some, Mr. Chairman. Shall I proceed?

Senator BURNS. You may.

CLEAN COAL TECHNOLOGY PROGRAM

Senator BYRD. 2½ years ago, I referred to this earlier, candidate George Bush endorsed the Clean Coal Technology program, he committed to spend $2 billion over 10 years to support that program. That's $200 million a year, a very strong endorsement of coal, and I'm sure that's one of the reasons he was able to carry the State of West Virginia in the 2000 election.

But despite his promise, in fiscal year 2002 he only proposed $150 million, in fiscal year 2003 he again proposed $150 million, and this fiscal year 2004 budget proposes just $130 million. By my calculation, I use the old math, I don't think the new math will be far off the point, that's $170 million behind on the promise. Rather than seeking $600 million for the Clean Coal program, as candidate Bush promised, the administration sought only $430 million, 38 percent less than what was pledged. That seems to be a credibility gap between what was said and what has taken place. What can you say, Mr. Secretary, to the people who heard Mr. Bush as a candidate proclaim if he was elected that he would spend $2 billion on

the Clean Coal program, and does the administration have a plan to live up to its commitment?

Secretary ABRAHAM. I would state that we are $430 million ahead of where we were, and the administration has demonstrated those commitments, and in a variety of other regulatory debates that have gone on, that we are deeply committed, as I said earlier, to the coal sector and the role of coal in the energy mission. But I would just add to what I said earlier, that in addition to the Clean Coal Power initiative that you have discussed, there are 7 more years to go and we are mindful of the commitment that was made.

We have just announced the Future-Gen program, which I believe will be a very substantial $1 billion program over the next 10 to 12 years, so it's my anticipation that the Future-Gen program will be running parallel to the Clean Coal Power initiative and the combination of these over this time frame will at least reach the level that the President committed and could conceivably be a fair bit higher than that level when the price tags are added up at the end.

Senator BYRD. Mr. Secretary, you seem to be counting all coal research. Mr. Bush cited in specificity the Clean Coal program, not coal in general, he said Clean Coal. And so, there is a credibility gap. He wasn't talking about all coal, he was talking about clean coal research when he used that figure.

FUTURE-GEN

Secretary ABRAHAM. Senator, again, I focus on our Future-Gen proposal as being the greatest enterprise that will be undertaken to demonstrate how we can generate power with coal in an environmentally clean fashion. It complements the Clean Coal initiative that you referenced and so I believe, as I said, over the 10 years, I mean, the combination of those programs will more than meet the $2 billion commitment the President made.

NATIONAL ENERGY TECHNOLOGY LABORATORY

Senator BYRD. The administration's request for the Office of Fossil Energy contains $92.7 million for employee salaries and expenses. Most of those people are assigned to the National Energy Technology Laboratory headquartered in Morgantown, West Virginia. On the face of it, it would appear to be a $5.5 million increase over the fiscal year 2003 enacted level. But just as it did last year, the administration has again double counted $14 million in employee salaries previously authorized under the Clean Coal acts. The true request, therefore, is not $92.7 million, but, rather, $78.7 million, an 11 percent cut that translates into a loss of 150 jobs.

The country cannot afford to lose 150 of the brightest fossil energy scientists we have. I can assure you that I will do everything I can to see to it that this budgetary sleight-of-hand is reversed. In the meantime, would you please tell the committee the rationale for this decision, and is the Department of Energy responsible or as I would rather think, have you been dictated to by the Office of Management and Budget?

Secretary ABRAHAM. Senator, I take all the responsibility, because that's my job, and my only comment would be that we cer-

tainly will do our very best to address the issue of the work force. I'm happy to note that in addition to the money we had available to work with when we submitted the budget, the advanced appropriations which were included in the final enacted budget included an additional $80 million which we did not have access to when we made our submission for Clean Coal Technology. Obviously, the implementation of programs with that money will require us really to have more program direction and we'll work within that amount certainly to try to address the question of our work force.

FOSSIL ENERGY PROGRAM TOP-TO-BOTTOM REVIEW

Senator BYRD. Last year when you testified before the subcommittee, you told the subcommittee that you had directed the new assistant secretary to conduct a top-to-bottom review of all programs under his jurisdiction. And on November 21, 2002, you wrote to me that the committee would be fully briefed on the contents of the review as soon as it had been approved by the Office of Management and Budget. The approval has now taken place and I know our subcommittee has, in fact, received a copy of the review, but I don't believe our staff has been fully briefed on its contents, nor have they had the opportunity to ask questions about the review's many recommendations. For example, it would be helpful to know more about the management reforms that have been proposed on page 4 of the review for the Office of Fossil Energy and the National Energy Technology Lab in Morgantown. Given the fact that any such reorganization would have to be approved by the committee before it could be implemented, it's important to have these matters discussed with our staff as soon as possible.

Can you tell us when you anticipate having the fossil energy staff brief the subcommittee staff?

Secretary ABRAHAM. I believe, Senator, in fact your staff brought this specifically to my attention, or at least that there has been inadequate communication between our staffers, this week on Tuesday. I conveyed that to my staff on Tuesday. My understanding is there was conversation yesterday with an offer actually to come up yesterday to provide an initial opportunity to have discussions, but because of the hearing that was happening today, that was not feasible. So it's my understanding there will be a meeting next week. I don't know that that will satisfy all of the issues, but it will be a starting point of what I hope will be much more frequent discussion and dialogue between the staffs. And I would make clear to you as I did to your staff, that if there is an inadequate level of this communication, please bring it to my attention and I will be happy to address it.

Senator BYRD. Very well, thank you. If you do intend to move forward with a reorganization, can you tell the committee whether you expect to formally seek the committee's approval?

Secretary ABRAHAM. I guess I'm happy to try to answer that, but I'm not sure I can answer it at this time. Perhaps the Assistant Secretary, who is here—within the next week would be a time frame in which the request should be forthcoming.

COMPETITIVE SOURCING PROGRAM

Senator BYRD. Very well, thank you. Mr. Chairman, I have just a couple other quick ones, if I may.

One of the government-wide initiatives that I am particularly interested in is the administration's competitive sourcing program. As I understand it, the Office of Management and Budget essentially scores each department and agency on how well it complies with the President's management agenda. The various agencies are encouraged to submit management plans to the OMB and to meet competitive sourcing targets outlined in the President's budget. I have been informed by officials at OMB that these plans, while submitted to OMB for approval, may be released to the public at the discretion of the agency or department head.

If this subcommittee is to recommend the appropriation of nearly $1.8 billion to the Department of Energy for the programs under the committee's jurisdiction, I think it's reasonable to expect a full accounting of any management plan or competitive sourcing plan submitted to OMB for approval. Will you please tell the committee the status of your Department's competitive sourcing plan, and will you agree to make it available to the Congress when it is complete?

Secretary ABRAHAM. Senator, I would be happy to make it available if it is—unless there are constraints I am unaware of. If it is being made available by other agencies, we wouldn't have a different viewpoint on that, and I would be glad to also provide, if the committee would like, some kind of personal briefing on it by the folks who have been engaged in the competitive sources work.

[The information follows:]

U.S. DEPARTMENT OF ENERGY, REVISED COMPETITIVE SOURCING PLAN

[June 9, 2003]

BACKGROUND

The Department of Energy [DOE] listed 9,889 full-time equivalents [FTE] on its 2001 FAIR Act Inventory as "commercial," or about 67 percent of DOE's total civilian workforce of 14,717 FTE. These figures include 3,409 commercial FTE at the Power Marketing Administrations [PMA]. Since the PMAs are largely funded by ratepayers and are already subject to the competitive forces of the marketplace, the Department and the Office of Management and Budget [OMB] mutually agreed to exclude the PMAs from the competitive sourcing initiative. Consequently, the Department's overall goal is to study 3,230 positions or 33 percent of its commercially coded FTE. In March 2002, DOE commenced studies on 972 FTE. As a result of further review and analysis, the total number of FTE included in the Department's first round of studies has increased to approximately 1,100. DOE plans to study an additional 2,100 FTE in fiscal year 2004 and beyond to reach its OMB mandated objective. It is expected that the taxpayers will benefit from the initiative, regardless of who wins the competitions, as a result of reduced costs, greater effectiveness, and increased responsiveness.

SUMMARY OF THE MANAGEMENT PLAN

The Department plans to meet its goals through the use of in-house and contract support resources. The Department assembled a team of management, human resources, financial, acquisition and functional area analysts and defined the conversion, public-private competitions and privatization initiatives necessary to meet DOE's fiscal year 2002 and fiscal year 2003 performance targets. The Department awarded Performance Based Service Contracts (PBSC) to support the development of the management studies and competitions. The provisions of OMB Circular A–76 govern DOE's studies and competitions. The Department will continue its ongoing studies and will conduct feasibility studies to determine the specific activities and related FTE that should be studied in future rounds. Business case anaylses

will be the methodology employed, as well as a determination as to the studies' resource impacts and the ability of the Department to sustain its mission.

Below is a further breakout of the fiscal year 2002/2003 plan by Departmental function and FTE. The name of the individual responsible for the Department of Energy's Office of Competitive Sourcing/A–76, with telephone number, is also provided.

Competitive Sourcing Project Manager: Dennis E. O'Brien, Office of Management, Budget and Evaluation/CFO

Phone Number: (202) 586–1690

The Department, on March 22, 2002, announced an initial list of 927 FTE to be competed in fiscal year 2002/2003. As anticipated, the number increased to approximately 1,100. It is expected that the scope of the studies and changes to the baseline will occur as the teams continue to review the functions and FTE under study.

Announced cost comparison functions: Financial Services, 150 FTE, Department-wide. Revised to 159 FTE; Information Technology, 420 FTE, Department- wide. Revised to 642 FTE; Human Resources (training), 98 FTE, Department-wide. Revised to 130 FTE; Logistics, 190 FTE, Department-wide. Revised to 220 FTE; Personnel Security Investigators, 27 FTE, Department-wide. Study Deferred; Paralegal Support, 21 FTE, Department-wide. Exempted from further study; Graphics, 13 FTE; and Civil Rights Reviews, 8 FTE.

These figures do not include contractor positions that are also being studied by the A–76 Teams.

Overall the Department expects to compete at least 30 percent percent of its adjusted 2001 FAIR Act inventory upon the conclusion of its first round of studies.

We estimate that the one-time additional budgetary cost of conducting these competitions will be about $6M (based on an estimated cost of $7,700 per FTE for a multifunction/multilocation study subjected to a full public-private cost comparison and other associated study and acquisition costs).

The Department has completed the initial overview training program for competition managers, program managers, selected employees, and labor organizations that focused on the A–76 process. The Department's training emphasized performance and delivering quality service in the most cost-effective manner.

Tasks	Completion date
Complete fiscal year 2001 FAIR Act Inventory/Challenges/Appeals	Completed.
Develop Competitive Sourcing Plan	Completed.
Identify functions, locations and FTE	Completed.
Coordinate program with employee labor organizations	Completed.
Establish communication/training program	Completed.
Publish guidance for functions with 10 or fewer FTE	Completed.
Publish guidance for cost comparisons	Completed
Create tracking and reporting database	June 2003.
Develop, plan and schedule fiscal year 2002/2003 studies	Completed.
Assemble team to review inventories/functions on sourcing plans	Completed
Review competitive sourcing plans and adjust as needed	Completed
Identify potential functional or geographic groupings	Completed
Determine schedule for function reviews	Completed
Announce functions to be studied in fiscal year 2002/2003	Completed
Develop performance-based work statements for common functions	Completed
Issue Guidance for fiscal year 2002 FAIR Act Inventory	Completed.
Submit fiscal year 2002 FAIR Act inventory to OMB	Completed.
Establish Study Team Organizations	Completed.
Select Study Team Support Contractors	Completed.
Develop and submit for Secretarial approval individual study action plans	Completed.

FISCAL YEAR 2004/05 COMPETITIVE SOURCING/A–76 PLANNING

DOE is initiating a feasibility study to determine the FTE to be competed in fiscal year 2004–2005. This study will encompass cost benefit tradeoff analyses, identification of potential functions/organizations and related FTE, identification of locations and recommended number of studies, identification of insourcing opportunities and characterization of mission/personnel and geographical impacts. The result will be the development of the most effective and efficient business case to support particular study areas.

INSOURCING

DOE has and will continue to explore insourcing opportunities when it is deemed appropriate to fulfill mission requirements and in cases where significant effi-

ciencies and economies can be achieved. The Department received approval under the fiscal year 2001 Energy and Water Development Appropriations Act to federalize its Emergency Operations contractor workforce. To-date, this has resulted in a conversion of 30 contractor positions with an additional 5 positions expected to be federalized by the end of fiscal year 2003. Overall, this national security related initiative will result in a net savings of $1.7 million annually. These savings will be redirected to enhance emergency operations training and to provide additional technical assistance to the field. Also during fiscal year 2003 and 2004, DOE will be soliciting organizations to identify insourcing opportunities warranting an A–76 study. To date, potential insourcing opportunities have been identified and are being investigated in the function of aircraft maintenance.

Senator BURNS. I think that would be helpful.

CLEAN ENERGY TECHNOLOGY EXPORTS

Senator BYRD. I have one last question. Congress has urged the administration to support increased opportunities to open and expand international energy markets and export U.S. clean energy technologies to developing countries and other nations abroad. These efforts are very important to help meet our own energy security needs, addressing related economic job creation, trade, environmental, and climate change objectives. Additionally, such efforts could significantly aid in meeting other nations' infrastructure and development needs while also increasing the deployment of a range of U.S. clean energy technologies, including clean coal technologies.

The Clean Energy Technology Exports, or CETE, will help meet that challenge. It had its genesis within the Senate Appropriations Committee and has had broad bipartisan support. The administration has talked about such ideas on occasion, but despite such rhetoric, the participating Federal agencies have done little, if anything, to implement the strategic plan. It seems to me that someone is sitting on their hands and missing a critical opportunity.

Because the Department of Energy is a leading agency involved in the implementation of the CETE initiative as called for by the Congress and released by the administration in October of 2002, what specific actions is your agency taking to work with the other Federal agencies and to engage nongovernmental organizations, private sector companies, and other international partners with regard to this plan? And can you tell the committee when the Appropriations Committee will receive the required annual CETE progress report that was due to this committee on March 1, 2003?

Secretary ABRAHAM. Senator, here is what I know we have done. We have created a new Office of International Energy Market Development, and acting separately the Fossil Energy Division has developed an international program for clean coal which will augment the efforts of that. We have now been designated to be a cochair of the interagency working group to try to promote clean energy exports, so that gives us a greater role in being able to move this ahead, which we intend to do.

Obviously, a lot of work that we are engaged in is applicable to sharing internationally. But if I could just go beyond the confines of that program to reassure you that this is a high priority that I have personally become engaged with. We have a lot of meetings both in Washington, and occasionally in multilateral and international settings with developing countries who are just starting to look at how they can address their growing demand for energy with environmental concerns, and we have been looking at a lot of bilat-

eral working groups to try to provide that assistance on that basis as well.

It is probably the single most frequently requested support that I receive when I am having a meeting with an energy minister from a developing country because they are challenged, they don't have the technology to do the sorts of things they want in an environmentally clean or effective way. So I see it as an area of substantial growth on the international side of what we do, even in addition to the program which you talked about.

I'm not sure what the status of the March 1 report is and if somebody with me can answer that, and if they can't, we will get you an answer for the record immediately.

[The information follows:]

STATUS OF CLEAN ENERGY TECHNOLOGY REPORT

The Department expects to submit the clean Energy Technology Report to Congress by the end of July 2003.

Senator BYRD. Very well. If I have further questions, Mr. Chairman, I would like to submit them for the record.

SOLID STATE CONVERSION ALLIANCE

Senator BURNS. You might update us along the same lines with respect to the solid state conversion alliance. Can you update the committee on the progress of the program and how you propose allocating resources for fiscal year 2004, to ensure you have adequate resources for the team to fulfill its promises?

Secretary ABRAHAM. I will be happy to. I will comment in general here, I don't think there is at all disagreement as to the potential for solid state energy production the program is designed to achieve. I think we are in total agreement, as far as I can tell, which is, this is a program with which we are in agreement in terms of what the issue is, what is the pace at which we get there and what is the timetable that has the highest potential for success. So, I will be glad to get that information for the committee.

[The information follows:]

SOLID STATE ENERGY CONVERSION ALLIANCE

Overall, the Solid State Energy Conversion Alliance Program [SECA] is progressing extremely well. In fact, there is early interest from auto manufacturers in SECA type fuel cells as evidenced by BMW's arrangement with Delphi, one of the SECA industry team developers, to put a compact fuel cell unit for auxiliary power in the trunks of BMW vehicles by 2007.

The SECA program is dedicated to developing innovative, effective, low-cost ways to commercialize solid oxide fuel cells [SOFCs]. The program is designed to move fuel cells out of limited niche markets into widespread market applications by making them available at a cost of $400 per kilowatt or less through the mass customization of common modules. SECA fuel cells will operate on today's conventional fuels such as natural gas, diesel, as well as coal gas and hydrogen, the fuel of tomorrow. The program will provide a bridge to the hydrogen economy beginning with the introduction of SECA fuel cells for stationary (both central generation and distributed energy) and auxiliary power applications.

The SECA program is currently structured to include competing industry teams supported by a crosscutting core technology program. SECA has six industry teams working on designs that can be mass-produced at costs that are ten-fold less than current costs. The SECA core technology program is made up of researchers from industry suppliers and manufacturers as well as from universities and national laboratories all working towards addressing key science and technology gaps to provide breakthrough solutions to critical issues facing SECA.

The SECA industry teams collectively are making very good progress. Delphi, in partnership with Battelle, is developing a 5 kW (kilowatt), planar, 700C–800C, anode-supported SOFC compact unit for the distributed generation [DG] and auxiliary power unit [APU] markets. Delphi is expert at system integration and high-volume manufacturing and cost reduction. They are focused on making a very compact and light-weight system suitable for auxiliary power in transportation applications.

General Electric is initially developing a natural gas 5 kW, planar, 700C–800C, anode-supported SOFC compact unit for residential power markets. GE is evaluating several stack designs and is especially interested in extending planar SOFCs to large hybrid systems. They also have a radial design that can simplify packaging by minimizing the need for seals. GE has made good progress in achieving high fuel utilization with improved anode performance using standard materials by optimizing microstructure.

Cummins and SOFCo (formerly McDermott) are developing a 10 kW product initially for recreational vehicles [RVs] that would run on propane using a catalytic partial oxidation [CPOX] reformer. The team has produced a conceptual design for a multilayer SOFC stack assembled from low-cost "building blocks." The basic cell, a thin electrolyte layer (50–75 micron) is fabricated by tape casting. Anode ink is screen-printed onto the one side of the electrolyte tape, and cathode ink onto the other. The printed cell is sandwiched between layers of dense ceramic that will accommodate reactant gas flow and electrical conduction. The assembly is then co-fired to form a single repeat unit.

Siemens Westinghouse Power Corp. [SWPC] is developing 5–10 kW products to satisfy multiple markets. SWPC has developed a new tube design for their 5 kW units that use flat, high power density [HPD] tubes. This allows for a shorter tube length and twice the power output compared to their current cylindrical tube. It also results in more efficient manufacturing, assembly, and better volumetric power density.

The Department is requesting $33 million in fiscal year 2004 for the SECA Program from several research budget elements. Primary funding of $23.5 million will be provided from the Distributed Generation Fuel Cells Innovative Concepts budget line. This funding will be primarily for the six industry teams. In addition, $6.0 million for SECA from Fuel Cells Advanced Research will be used for the SECA core technology program, $1.5 million for SECA from Advanced Research—for research on materials for coal-based SECA systems, and $2.0 million for SECA from Advanced Metallurgical Research (Albany), for metallurgical research applicable to general SECA systems. Additionally, in fiscal year 2004, we will begin funding the two additional SECA industry teams just added in fiscal year 2003—Fuel Cell Energy and Acumentrics. These industry teams represent additional industry design alternatives that will enhance the prospects of success of SECA fuel cells for a broader market. The SECA program cost-share levels range from 20–50 percent. For the industry teams the cost share begins at 20 percent and ends at 50 percent for later phases.

Senator BURNS. Okay, I think that takes care of just about all our questions. There will be a couple more coming up. And I want to thank Senator Byrd for being here this morning, and for you. We know the scheduling is tough. We will leave the record open for a couple weeks and hopefully after the break, we will begin finalizing these appropriations.

Secretary ABRAHAM. Senator, thank you.

ADDITIONAL COMMITTEE QUESTIONS

Senator BURNS. There will be some additional questions which will be submitted for your response in the record.

[The following questions were not asked at the hearing, but were submitted to the Department for response subsequent to the hearing:]

QUESTIONS SUBMITTED BY SENATOR CONRAD BURNS

HYDROGEN TRANSPORTATION SYSTEM

Question. Your testimony refers to the difficult "chicken and egg" problem that confronts us as we discuss moving to a hydrogen-based transportation system. No consumer is likely to invest in hydrogen or fuel cell products without adequate fueling infrastructure in place, and nobody will invest in fueling infrastructure without customers. How do you think we get past this problem?

Answer. Launching a hydrogen-fueled transportation system does face the classic "chicken and egg" question as it relates to fuel cell vehicles and hydrogen infrastructure. Establishing a new fuel infrastructure such as hydrogen will be complicated, yet it will need to be largely in place when widespread fuel cell vehicle introduction starts. Strong market signals will be needed for this infrastructure development to happen, making low cost hydrogen production and delivery technologies essential. Transition strategies will have to be developed that are far more effective than what has been used to foster markets for today's alternative fuels. The exact nature of those strategies will depend on infrastructure and vehicle technologies that are far from being fully developed. Therefore, the Department is working with all stakeholders to develop both the vehicle and the infrastructure technologies in parallel. DOE's planning efforts have included the FreedomCAR Partnership Plan, the National Hydrogen Energy Roadmap, and R&D plans. These documents describe how DOE will integrate its ongoing and future vehicle and hydrogen R&D activities into a focused effort. This coordinated DOE effort will improve the effectiveness and accountability of DOE's research, development and demonstration (RD&D) activities and strengthen its contribution to achieving the technical milestones on the road to a hydrogen economy.

Question. What have we learned to date from efforts to get other alternative fueled vehicles into the marketplace?

Answer. Our experience with alternative fuels tells us that the issue of reasonable fuel availability must be resolved before widespread acceptance of dedicated alternative fueled vehicles is possible. DOE learned that consumers find it simply more convenient to operate fuel flexible vehicles with petroleum-based fuels rather than alternative fuels because of the lack of alternative refueling stations. In addition, natural gas, methanol and ethanol vehicles are limited to niche markets or certain regions because fuel for these vehicles isn't available nation-wide.

Because hydrogen is a universal energy carrier made from various primary energy resources, we think it can be a standardized national fuel. This assumes successful resolution of technical and cost barriers, and development of codes and standards. To address these issues, the Department is launching a transportation and infrastructure partnership with industry and local government agencies to demonstrate and evaluate fuel cell vehicles under real operating conditions to obtain cost, performance and reliability information, and hydrogen fueling stations to validate efficient, clean, and economical hydrogen production, storage, and delivery technologies, including standard vehicle refueling interfaces, safety practices, and codes and standards.

Question. Some have suggested that natural gas might be a logical bridge to a hydrogen based transportation system. Is there merit to this suggestion, or are we likely to have to make the leap directly to hydrogen from today's gasoline-based system?

Answer. Hydrogen does present a long-term solution to America's energy security needs, and can do so with significant benefits for the local and global environment. Hydrogen is an energy carrier, not an energy resource like natural gas, and can be produced from a variety of domestic feedstocks. This feedstock diversity is a benefit unique to hydrogen and means we would not be dependent on any one energy resource.

In the near-term, natural gas will be an important hydrogen feedstock. It is a good choice for near-term hydrogen production because the distribution infrastructure exists, and because the economics are presently more favorable than that of other feedstocks.

Hydrogen production is not expected to increase demand for natural gas by any more than 5 percent in 2025, due to the small number of vehicles expected to be on the road. The vehicle infrastructure needed for these demands will be small. It is envisioned that as the hydrogen fuel cell vehicle fleet increases, our ability to produce hydrogen from other sources will grow to match it. In the long-term, we hope to generate hydrogen through renewable energy and other carbon-free processes, such as nuclear energy.

ADVANCED VEHICLE TECHNOLOGY PROGRAMS—PARTNERSHIP FOR A NEW GENERATION OF VEHICLES (PNGV) AND FREEDOMCAR

Question. Your budget states that the FreedomCAR program will build on the successes of the Partnership for a New Generation of Vehicles (PNGV) program and learn from its failures. What were the successes of the PNGV program?

Answer. PNGV provided the framework for government and industry to align previously independent research to address common societal goals. The partnership opened up new channels of communication between industry and government, which has provided both parties with access to more and better technical data.

In its annual reviews of the PNGV, the National Research Council noted "the substantial accomplishments already gained in pursuing the program so far" (seventh report—2001) and observed that the partnership has "enhanced cooperation at all levels and has achieved results more rapidly than would have been the case in the absence of partnership" (6th report—2000). Selected concrete examples of technological achievements are listed below.

Enabling research

—Increased the life of lithium ion batteries from 2 years to 7 years for hybrid-electric vehicle drives.

—Demonstrated that, under certain conditions, advanced diesel fuel formulations can achieve particulate matter (PM) emission reductions of up to 35 percent without compromising fuel efficiency or raising oxides of nitrogen (NO_X) emissions.

Vehicle integration

—The aluminum body structure on the Ford's Prodigy concept vehicle is 53 percent lighter than a conventional steel design, and the process used on the Prodigy is applicable to high volume production.

—In DaimlerChrysler's ESX3 concept vehicle, the unique thermoplastic injection molded body system is estimated to reduce weight by 46 percent and cost by 15 percent versus conventional steel structures.

—General Motors' Precept concept vehicle proved the technical feasibility of achieving 80 miles per gallon, however, high cost remained as a major barrier toward commercialization.

PNGV Research successes migrating into production

—Cadillac, Oldsmobile, and Chevrolet vehicles incorporate aluminum door, deck, and hood panels by utilizing a PNGV developed production processes.

—The 2001 Chevrolet Silverado uses a 50-pounds lighter composite pickup truck box.

—The 2001 Jeep Wrangler utilizes a new, lighter, recyclable thermoplastic hardtop.

FreedomCAR will build on the technology advancements gained from successful PNGV R&D efforts. The new research portfolio, focused on longer range, higher risk research, will be applicable to a broader range of production vehicles.

Question. What were PNGV's failures, and what have we learned from them?

Answer. FreedomCAR is taking advantage of the technological progress made under the PNGV to build a stronger, better partnership more closely aligned with the Nation's needs. The centerpiece of the FreedomCAR Partnership is the effort to develop efficient, affordable fuel cell technologies that can help to reduce our Nation's petroleum consumption while eliminating vehicle emissions.

One key improvement of FreedomCAR compared with PNGV concerns management structure. DOE, the agency that funded the majority of PNGV activities, now solely represents the government in the partnership, with consultation from other agencies as appropriate. The streamlined organizational structure improves communication with the industry.

Another improvement is in the research time horizon and focus. The PNGV had a 10-year horizon and was aimed at a single vehicle platform, the mid-size sedan. In order to meet the accelerated 10-year horizon, some promising technologies (i.e., ultracapacitors) were prematurely downselected from the research portfolio. These technologies were unable to meet the requirements of the PNGV within the 10-year horizon. The single vehicle platform narrowed the research focus on a vehicle segment that was the highest selling segment at the start of the partnership but did not address the explosion in the sport utility vehicles.

FreedomCAR is focused on performing R&D at the component and sub-systems level and leaves the vehicle integration of these technologies to the automakers, offering more flexibility. As in the PNGV, FreedomCAR places significant effort on the core technologies supporting hybrids, such as advanced materials and batteries, not

only because the work is essential for the hydrogen vehicle but also because of the near-term benefits possible from petroleum-fueled power sources in hybrid.

TRANSITION OF TECHNOLOGIES TO MARKET

Question. In several places your budget request terminates or reduces funding for activities that are closer to the deployment end of the R&D spectrum, choosing instead to focus resources on more basic, high-risk research. Generally speaking I understand this philosophy, but at some point we run the risk of investing in a lot of technological advances that will sit on the shelf without some additional support for deployment or demonstration. Do you think your budget request is balanced in this regard?

Answer. Yes, I believe it is balanced. About ten years ago these programs made a similar (but opposite) shift in their balance, moving some resources from more basic work to near-term and deployment efforts. That was never intended to be a permanent change in balance. To some degree, we have been living off accumulated intellectual capital, and we now need to move the balance back toward more fundamental research in order to replenish those reserves and refill the technology pipeline. This is not a wholesale change in our R&D balance, however: we are continuing to propose substantial funding in a variety of deployment activities.

Energy markets are changing and our energy policies have matured. The unusually low energy prices of the 1990s made it particularly difficult for new technologies to enter the marketplace successfully, and our energy policies were focused on showing action on near-term reductions in greenhouse gas emissions. While today's energy prices are not high in historical terms, they are high enough to create significant economic incentives for energy efficiency in applications such as industrial processes.

The progress we made on advancing hybrid vehicle technology has caused almost every major automobile manufacturer in the world to turn their attention to such vehicles, and competitive pressures are now growing to the point where most major auto manufacturers have announced production plans for at least some forms of hybrid vehicles. But the types of hybrids currently being announced and produced use conventional engine technologies, and do not offer the really dramatic gains in efficiency that we believe are possible with advanced technologies such as fuel cells and unconventional lightweight materials.

In many cases, including hybrid and electric vehicles, the technologies we are currently deploying run the risk of remaining niche-market products unless technology breakthroughs or leapfrog approaches make their performance and economics so compelling that they become mainstream.

Our energy and climate-change policies are now focused on the 2015–2020 timeframe, and we have a renewed emphasis on energy security. In order to make a major market impact in that timeframe, products will need to be competitive in broad market segments, not just niche markets, which is driving our search for leapfrog technologies in activities such as the FreedomCAR Partnership, the Hydrogen Fuel Initiative, solid-state lighting for buildings, and distributed energy resources.

Question. Take black liquor gasification, for example. We've invested significant funds to develop this technology in partnership with the pulp and paper industry, and the Department had expressed its intention to participate in at least three demonstrations of different gasification technologies. Now the budget proposes to terminate the program after only one partial demonstration. There is great potential for reduction in energy use and emissions if advanced technologies are deployed, but industry says the capital investment is simply too large to justify investing in an unproven technology. Is the industry just bluffing in your opinion?

Answer. The Department did not request funds for the industrial gasification activities under the Interior Appropriation in fiscal year 2004 based upon the state of technology advances made and a review using the Administration's R&D investment criteria, which helped guide this decision. The Department has invested substantially in R&D on the thermochemical conversion of biomass for producing power, fuels, and products that is directly applicable to the pulp and paper industry. We also are continuing with R&D on advanced technologies that will further lower the risk to industry for the deployment of these technologies. Additionally, we have committed available funds to complete our obligation for the black liquor gasifier demonstration at Big Island, VA.

As discussed in the previous question, we believe that there are sufficient economic incentives for industry to adopt many new energy efficiency technologies such as black liquor gasification. When it comes to determining the appropriate Federal role in R&D, there is frequently an inherent tension between the Federal Govern-

ment (acting as a prudent steward of taxpayer dollars while seeking to maximize benefits from a broad research portfolio) and industry (which seeks to minimize new technology development and acquisition costs in order to reduce outlays and achieve a greater financial return for its investors). Thus, while the Department does not wish to conclude that industry is "just bluffing" in this instance, we would note that we believe it would be shortsighted of industry should they decide not to bring this gasification technology to commercialization.

Question. Do you think market forces will eventually compel companies to install these new technologies on their own, or that industry will be forced to do so because of regulatory pressure?

Answer. Those factors and more will provide businesses with the incentive to use or market the technologies that we have been developing. Virtually all of our efforts are planned in conjunction with industry, and the "road mapping" process we have used means that we know the technologies we have developed are useful, and the roadmaps give the companies a good sense of how they can utilize the technologies for their own benefit. In the case of some industries, such as the automakers discussed above, it is competitive pressures that will lead to adoption of new technologies. In energy-intensive industries, such as pulp and paper and the ones we have worked with in our Industrial Technologies program, the companies would be financially shortsighted not to make use of the energy- and cost-saving technologies we have developed. In yet other industries, the regulatory pressures you allude to may become important—there is clearly more interest now among heavy truck and bus manufacturers in adopting more efficient, less-polluting engine technologies than there was prior to the recent tightening of heavy diesel emissions standards.

OFF-HIGHWAY VEHICLE R&D

Question. According to the budget justification, the rather small Off-highway Vehicle R&D program is being terminated "because other research opportunities have higher impact on energy savings." In looking at the Department's own R&D roadmap off-highway research, however, I find that off-highway uses account for 20 percent of fuel use in the transportation sector. I also find that of all mobile sources, large off-highway diesel engines contribute 20 percent of NO_X emissions and 36 percent of particulate matter. Can you reconcile these figures on energy use and emissions with your decision to terminate a $3.5 million program?

Answer. The definitions of "Off-Highway" and "Non-Highway" that DOE uses are found in the Transportation Energy Data Book, which is published annually by Oak Ridge National Laboratory for DOE. Off-Highway includes vehicles that are used in construction and agriculture. These vehicles accounted for 3.4 percent of transportation energy use in 2000. Non-Highway includes aircraft, marine vessels, rail and pipeline. These activities accounted for 21.1 percent of transportation energy use in 2000. The Off-Highway Vehicle R&D effort within the FreedomCAR and Vehicle Technologies Program was aimed at saving oil in vehicles that account for less than four percent of the oil used in transportation, therefore the potential oil savings would be small relative to potential oil savings achievable by shifting these funds to other aspects of our transportation sector R&D portfolio.

While off-highway vehicles currently contribute a disproportionately large amount of NO_x and PM, we anticipate that EPA's existing and proposed future emissions standards, to be phased in over the next decade, will result in a significant decline in criteria pollutant emissions from these sources.

ENVIRONMENTAL IMPACTS OF FUELS

Question. Your budget also eliminates funding for analysis of the environmental impacts of fuels, deeming this activity to be in the purview of other agencies. While I would agree that DOE shouldn't be duplicating the efforts of EPA or other Federal agencies, I think there have been times that the Department has had differences with EPA about the environmental impacts of various fuels or technologies. Are you at all concerned that termination of this program will weaken your hand in interagency policy or regulatory discussions?

Answer. DOE's and EPA's complementary efforts to research the environmental impacts of alternative fuels have been ongoing for many years at this point. DOE's work was intended to ensure that emerging technologies do not have unforeseen negative environmental impacts, as was the case with tetraethyl lead and MTBE (methyl tertiary butyl ether). In addition, DOE activities investigated the environmental effects of fuels derived from diverse feedstocks such as biorenewables, oil sands (tar sands), and even hydrogen. EPA's efforts focus on the determination of the impacts of current technologies and fuels on the environment.

The DOE work provided a feedback loop to the management of our research and development efforts, but we believe that the topics have been quite thoroughly researched now. If such feedback is needed for additional fuels in the future, we feel we can rely on external organizations. EPA will continue to conduct the comprehensive evaluations necessary to support regulations. Since their research, rather than ours, has been what has driven regulations, we do not expect any regulatory impact from the termination of our program.

PERFORMANCE MEASURES

Question. First of all, let me acknowledge the work that your staff has done to be responsive to this committee's repeated calls for better, more clearly written budget justifications. I'm not saying it's a perfect document yet, but this year's product is an improvement in many areas over past years. Some of the more interesting displays in the justification are your Government Performance and Results Act estimates that project the benefits of your R&D programs. I know this is a complex undertaking, but the numbers do raise some interesting questions. Among the Energy Conservation R&D programs, the Industrial echnologies program, the Vehicle Technologies program and the Buildings Technologies program are expected to produce by far the largest savings in energy use, oil consumption, and carbon emissions. In spite of this, the Industrial Technologies program is taking the largest cut of any program, and the vehicle and buildings programs are being reduced as well. How should we interpret this seemingly conflicting information?

Answer. Potential benefits are but one consideration in making difficult allocation decisions. Other considerations include program performance, relative priority, and alignment with the Administration's R&D investment criteria, among others (see response to next question). One aim of the R&D investment criteria is to ensure an appropriate Federal role exists, and that there are market barriers causing underinvestment by the private sector. In the case of many Industry Program R&D activities, firms have the financial incentive to invest in energy efficient technologies that can reduce their costs. Thus, the seemingly conflicting information you describe can be explained by our determination that, despite potentially large benefits, many industry R&D activities benefit firms more than the taxpayer, so there is less of a Federal role in these activities.

We would make two important notes. First, on the whole, the reductions you identified were more than offset by increases in other programmatic areas. For example, reductions for some activities in the FreedomCAR and Vehicle Technologies program were more than offset by increases in the Hydrogen (in the Energy Supply account) and Fuel Cells subprograms. This represents a shift in funding from near-term technology issues that industry is very capable of addressing, such as combustion engines and petroleum-based fuels, to more advanced technologies that offer greater energy and carbon-emissions benefits in the long term, such as fuel cells for hybrid vehicles. Second, we continue to improve our modeling assumptions and scenarios so that we can better compare potential benefits of technology investments within and between programs. This effort is a priority in helping to implement the Administration's R&D investment criteria.

Question. Aside from the expected benefits in terms of energy savings and emissions reductions, what other inputs are used as you develop your budget request?

Answer. We seek a portfolio balance among a number of criteria:

—the energy savings and emissions reductions that you've already mentioned, plus

—other benefits like:
  —energy security,
  —pollution reduction, and
  —net economic benefits to society;

—program performance and alignment with the Administration's R&D investment criteria, which include many policy considerations such as:
  —the need for, or appropriateness of, a government role in a given technology (typically a clear public benefit with a market failure or friction that precludes optimal private investment);
  —plans for merit-based, competitive program execution;
  —industry's apparent commitment to adopting or marketing a technology (often as evidenced by their willingness to cost-share);
  —clearly-defined performance measures and decision-points for the R&D area;
  —a technology's or industry's track record of progress based on those performance measures; and
  —maintaining a portfolio balance of near-, mid-, and long-term technology RD&D in each of the major sectors of our economy.

FOSSIL ENERGY—DOMESTIC OIL PRODUCTION/IMPORTS

Question. First, I would like to commend the Department's efforts to keep an eye on energy markets through the work of the Energy Information Administration. However, I am extremely concerned that the Department seemingly ignores its own information in the formulation of budget priorities. During the early stages of the recent war with Iraq, crude prices shot to $38 a barrel and have recently stabilized at a lower level. However, all indicators seem to illustrate crude prices are rising again and stocks are low. Can you update us on the current state of the highly fluctuating oil markets?

Answer. We expect oil markets to continue to be volatile but well within the high and low limits established in the last two years. Supplies are dependent on the rate at which Iraqi exports return to market, the stability of West African production, recovery in Venezuela, the reaction of other non-OPEC producers to current prices and, of course, the level of exports from OPEC countries. Demand may also deviate from expectations, as the world's economies grow at rates different from projections. Given the current level of oil inventories, news will tend to move prices up and down rather quickly, but we do not expect them to approach either the highs set earlier in 2003 or the lows reached in early 2002.

Question. This Subcommittee has an acute interest in energy production, as most domestic production comes from land and waters under our jurisdiction, and the Fossil Energy portfolio under DOE requires our close attention due to the Administration's lack of adequate commitment to domestic energy R&D. Can give us a sense of how current crude imports compare to prior years as a percentage of domestic consumption?

Answer. In March 2003, the most recent month for which complete monthly data is currently available, the ratio of average U.S. crude oil imports to average domestic petroleum consumption (or products supplied) is estimated to have been 46.0 percent. The comparable percentage for March 2002 was 44.7 percent and for March 2001 it was 48.3 percent. For the first three months of 2003, the ratio of average U.S. crude oil imports to average domestic petroleum consumption is estimated to have been 43.2 percent. The comparable percentage for the first three months of 2002 was 45.6 percent and for the first three months of 2001 it was 46.4 percent. For the years 1997–2002, the ratio of the annual average U.S. crude oil imports to annual average domestic consumption ranged from a low of 44.2 percent in 1997 to a high of 47.5 percent in 2001, and for 2002 it was 46.3 percent.

Question. It is my understanding the recent reductions in crude costs are directly related to increasing imports. Given these trends, can you explain why your budget reduces funding for the Fossil accounts focused on increasing domestic oil production by 65 percent from the enacted level?

Answer. The Office of Fossil Energy has completed its Top to Bottom Review, and is beginning to implement it. The review provides a solid first step towards a new program direction, emphasizing results and focusing on customer groups in order to more effectively carry out the President's energy plan to increase energy security and improve the environment through his Clear Skies and Climate Change initiatives.

Certain program areas and projects that do not address the specific goals of this new direction will be terminated. As stated in the President's Management Agenda, spending large budgets without a clear goal does not necessarily achieve good results.

These changes were also in part a response to the results of the Investment Criteria Scorecards that were completed as part of the President's Management Agenda initiative for better R&D Investment criteria.

Additionally, the Program Assessment Rating Tool (PART) was completed for all program elements. Analysis of PART showed that the program did not link annual activities and outputs to long-term benefits. These outcomes reinforced the new program direction.

Question. Your own testimony before the House Interior Subcommittee last month states, "Previous oil program funding was spread thinly . . ." In my opinion reducing a "spreadly thin" [sic] budget by 65 percent when it is the primary budget focused on enhancing domestic oil recovery technologies seems a little haphazard at best. Can you reconcile this proposed reduction with your written testimony for the House and trends in domestic production?

Answer. The completed Top to Bottom Review, conducted by the Office of Fossil Energy resulted in a new program direction, emphasizing results and focusing on customer groups in order to more effectively carry out the President's energy plan to increase energy security and improve the environment through his Clear Skies and Climate Change initiatives.

Certain program areas and projects that do not address the specific goals of this new direction will be terminated. As stated in the President's Management Agenda, spending large budgets without a clear goal does not necessarily achieve good results.

These adjustments in the program's investment portfolio were also in part a response to the results of the Investment Criteria Scorecards that were completed as part of the President's Management Agenda initiative for better R&D Investment criteria.

Additionally, the Program Assessment Rating Tool (PART) analysis completed for all program elements showed that the program did not link annual activities and outputs to long-term benefits. These outcomes reinforced the new program direction.

Question. An alarming highlight of last month was what appears to be an all-time monthly record for gasoline imports. It is bad enough to be dependent upon other nations for raw natural resources, but it is even more alarming that we now are becoming increasingly dependent upon foreign nations to produce refined product. Can you explain whether this dependency on foreign gasoline is an anomaly or part of a trend?

Answer. In almost every year, gasoline demand increases. This increase can either be supplied by more production from refineries or increased gasoline imports. In recent years, suppliers have more economically increased supplies through the use of imports. There are several reasons for this.

First, for many countries, they produce more gasoline than they can consume. In Europe, for instance, diesel fuel and other middle distillates are the most important part of the barrel, and thus, surplus gasoline is produced. With the United States being the world's largest consumer of gasoline, it is thus not surprising that increasing amounts of gasoline arrive from Europe each year. In addition, if refiners were to increase gasoline production it would merely reduce the amount of other products that are produced, or else would require an increase in refinery throughput. The latter is an option only when refinery economics dictate that it would lead to increased income. This would usually require high product prices with comparatively lower crude oil prices. If, however, refiners kept the same throughput, but instead produced more gasoline at the expense of production of other petroleum products, that would dampen prospects for rebuilding low inventory levels for those products, e.g. distillate fuel.

That being said, it is likely that product imports, including those for gasoline, will continue to increase over the next several years. Of course, the alternative is to get the increased supplies needed form a source that would be less economical, thus putting an additional strain on the U.S. economy.

Question. What are the factors for this reliance and does the ongoing effort of the Department to divert domestic crude into the Strategic Petroleum Reserve have a tangible impact?

Answer. North America and Europe have long been integrated markets for refined petroleum products. This integration has proved beneficial for both the United States and Europe, allowing the best possible utilization of refineries and inventories. At times the United States is an importer of products and at others it exports to Europe depending on market conditions. At the moment, Europe is increasing its consumption of diesel fuel relative to gasoline, thereby making its surplus gasoline available for export to the United States at reasonable prices. The fact that the Strategic Petroleum Reserve is acquiring crude oil probably has only a marginal impact on oil prices, and whatever that impact, it is the same for United States and foreign refiners. Therefore, whether the Strategic Petroleum Reserve acquires or does not acquire crude oil is immaterial to the level of U.S. imports of refined products.

FOSSIL ENERGY—DOMESTIC GAS PRODUCTION/IMPORTS

Question. In February 2003, the gas markets were subject to unprecedented spikes as natural gas availability hit rock bottom. You'll remember that when you were serving in the Senate, similar cost spikes hit the electricity markets, leading to public outcry and the subsequent failure of many businesses. Could you update us on the natural gas markets?

Answer. Natural gas markets have recovered from the unprecedented spikes in February 2003 but they remain tight. Spot market natural gas prices were in the $5.24 to $6.24 range in May while natural gas inventories were at least 29 percent below the five-year average for this time of the year. Recent inventory additions have been at record-levels and the situation appears to be improving. However, the Energy Information Administration (EIA) projected in its June 2003 Short-Term Energy Outlook that natural gas prices will remain well above average; they are ex-

pected to average $5.50 to $6.00 per million Btu for the remainder of the year; 2004 natural gas prices are expected to ease slightly.

As I said at the time of that report, the nation's stocks of natural gas in underground storage are unusually low due to weather factors and declines in both domestic production and net imports. Industry is already responding by significant increases in storage rates, with record net injections reported in each of the first two weeks of June, but a hot summer could increase demand for natural gas that may jeopardize storage refill, and thus, exacerbate the problem.

I had previously asked the National Petroleum Council to conduct a study of natural gas in the United States that is expected to be released later this year but, in my view, we cannot wait to take action on the problem. Therefore, I have called for a special meeting on June 26 during which the National Petroleum Council will gather information, and discuss problems and solutions.

Question. What steps are the Department taking to help alleviate these gas supply problems?

Answer. In the near-term, we are working to better understand U.S. natural gas needs. In March 2002, we requested that the National Petroleum Council, an advisory body to the Secretary of Energy, conduct a comprehensive study of the North America natural gas market (supply, transmission, and demand issues through 2025). The results of this study will be delivered in September of this year.

We are also called on the Council to hold a National Gas Summit on June 26 to gather information from State and Federal officials, consumer groups, and industry experts, and discuss actions and develop recommendations that can be taken immediately to address the near-term natural gas situation. Among the measures expected to be discussed are those related to energy efficiency, conservation, and fuel switching. DOE will also publish a paper dealing with the issues associated with expanded supplies of natural gas from the Rocky Mountain region.

Question. I know the Natural Gas Technologies accounts under Fossil Energy focuses on exploration and production techniques as well as developing advances in infrastructure to prevent failures and enhance delivery capabilities. Unfortunately your budget request suggests reducing these activities from $47 million to $26 million. Can you explain the disconnect between the information collected by your Department and the direction the Research and Development Accounts appear to be headed?

Answer. The President's Natural Gas Technology research and development program under Fossil Energy accounts is intended to complement and enrich the existing portfolio of ongoing industry sponsored natural gas research and help ensure that long-term, high-risk technology options in exploration and production, gas hydrates, natural gas storage, and delivery reliability are explored.

The Office of Fossil Energy has completed its Top to Bottom Review, and is beginning to implement it. The review provides a solid first step towards a new program direction, emphasizing results and focusing on customer groups in order to more effectively carry out the President's energy plan to increase energy security and improve the environment through his Clear Skies, Climate Change, and Energy Security initiatives.

Certain program areas and projects that do not address the specific goals of this new direction will be terminated. As stated in the President's Management Agenda, spending large budgets without a clear Federal goal does not necessarily achieve good results.

These changes were also in part a response to the results of the Investment Criteria Scorecards that were completed as part of the President's Management Agenda initiative for better R&D Investment criteria.

The Office of Management and Budget's analysis of Fossil Energy's Natural Gas Technology Program Assessment Rating Tool (PART) submissions showed that overall the Natural Gas Technology program did not successfully link annual activities and outputs to measurable long-term benefits. These outcomes reinforced the new program direction and a reduction in the fiscal year 2004 budget request for Fossil Energy's Natural Gas Technology research and development program.

Question. Your budget also proposes a "new" initiative to produce hydrogen from natural gas sources. Much like your testimony on the Oil Research Development accounts, I believe our natural gas infrastructure is spread too thin. The prior administration envisioned a world based on natural gas, but without backing the vision with investment in technology. I fear the current administration is doing the same. While we are shifting all this demand to natural gas, domestic production is not increasing at a similar rate. How to you believe we prevent a demand crunch in the natural gas markets without investing in new technology?

Answer. The majority of the funding in our natural gas research program is directed to long-term technology development—where the government has a key role.

These efforts will help ensure that adequate supplies of natural gas are available to meet the long-term increase in demand—about a 50 percent increase by 2025.

Natural Gas Exploration and Production-Sustainable Supply program will provide new tools and technologies that can improve access, economics and environmental performance of onshore gas operations. Significant emphasis will be placed on public lands in the Rocky Mountain region where much of the nation's undiscovered gas resource is located.

Natural gas storage will also assume increasing significance as more power plants require consistent, year-round supplies of natural gas. A nationwide, industry-led consortium will develop ways to improve the reliability and efficiency of the nation's gas storage system.

Over the long-term, the production of natural gas from the U.S.'s vast deposits of methane hydrates, which is a program goal, could strengthen energy security and provide a major component of the Hydrogen Fuels Initiative. Understanding hydrates will also improve the scientific understanding of greenhouse gases and offer possible mechanisms for sequestering carbon dioxide. In the near-term, implications for drilling or producing oil and gas near or through hydrate formations will be defined, to avoid environmental issues that could arise with conventional oil and gas operations.

The environmental science program will focus on defining and mitigating issues constraining produced water from coal bed methane production.

Question. On the same topic, you list a new $6.5 million Hydrogen from Gas initiative under the Natural Gas Technology account. However, you reduce the Fuels account under Fossil Energy Research and Development from $31 million to $5 million. It is my understanding we were already performing substantial work in the Fuels budget that focused on hydrogen as a product. Could you detail how much DOE plans to focus on hydrogen production in the fiscal year 2003 Fossil Accounts?

Answer. In fiscal year 2003, the Transportation Fuels & Chemicals budget line in the Fuels program request was $5 million for Syngas Membrane Technology (SMT) activity with an additional $17.1 million added by Congress to increase this activity and to support the ongoing Early Entrance Coproduction and Ultra Clean Fuels (UCF) programs, and the new Hydrogen from Coal Research (HCR) program. Since syngas is a mixture of carbon monoxide and hydrogen and a few of the UCF projects produce syngas as an intermediate on the path to liquid fuels, it is fair to say that some of the Syngas Membrane Technology and UCF programs could be considered Hydrogen Programs. However, to be efficient, the projects would have to be modified with a substantial change in direction. Thus, the funding for fiscal year 2003 that focuses on hydrogen as a product includes the new HCR (about $2.4 million), SMT (about $6 million), and UCF (about $5.4 million).

FOSSIL ENERGY—FUELS

Question. Mr. Secretary, I am interested in your decision to essentially stop all advanced research in the Fossil program. For fiscal year 2003, Congress provided $31 million to continue research aimed at developing cleaner fuels from domestic fossil sources including coal, gas and petroleum. The strides made in producing new fuel products such as ultra clean diesel have given hope that we can produce and use much cleaner burning fossil fuels in the near term. Can you explain why you believe we should abandon research that is arguably on the verge of creating marketable solutions to near term environmental concerns?

Answer. The President's budget request for fiscal year 2004 of $5 million for the Fuels/Transportation Fuels and Chemicals program is to perform supporting research for the Administration's FutureGen and Hydrogen Fuel Initiatives. In addition, $6.55 million is being requested in the Natural Gas Technologies program—Emerging Processing Technology budget to support research on natural gas to hydrogen as part of the Administration's Hydrogen Fuels Initiative. The Department believes that this budget request is appropriate to support a balanced energy research program within the budget constraints in fiscal year 2004. In addition, considerable work is being conducted in the private sector on natural gas to liquids processes and we believe that industry is prepared to meet the promulgated EPA Tier II standards. The Department believes that research dollars would be better spent in longer-term fuels research such as that which is associated with the production, storage and delivery of hydrogen from coal and natural gas.

Question. You assert in your request that portions of the fuel programs proposed for elimination have been shifted to the Oil and Gas programs, which have been reduced by 65 percent and 44 percent respectively. Could you show the Subcommittee where exactly this research shows up in the Oil and Gas programs, and explain what level of funding will be provided under your proposal for fiscal year 2004?

Answer. In fiscal year 2003, the Fuels Program provides funding for both natural gas and coal based programs even though the Fuels Budget line is found in the Coal & Power Systems budget. However, in fiscal year 2004, the Fuels activities, which are related to production and delivery of hydrogen, will be split into two budget lines, one will remain in the coal program under Fuels and the other program activity will be moved to the Oil and Gas Program under the Emerging Process Technology activity in the Natural Gas Program. In fiscal year 2004, $6.555 million has been provided for this budget area.

Question. Will all ongoing contracts continue at the level of funding agreed to by the contractors and DOE?

Answer. The President's budget request for fiscal year 2004 of $5 million for the Fuels/Transportation Fuels and Chemicals program is for conducing research activities to develop advanced, lower cost technology for the production of hydrogen from coal for the Administration's FutureGen and Hydrogen Fuel Initiatives. In addition, $6.55 million is being requested in the Natural Gas Technologies program—Emerging Processing Technology budget to support research on advanced, lower cost natural gas to hydrogen technology, which is also part of the Administration's Hydrogen Fuels Initiative. The Department believes that the budget requests are appropriate to support a balanced energy research program within the budget constraints in fiscal year 2004. To the extent that funds are available, it is planned to continue those projects that can adjust their scopes of work to fit the new longer-term program goals. However, it is not likely that all contracts can be continued.

FOSSIL ENERGY—DISTRIBUTED GENERATION—FUEL CELLS—VISION 21—HYBRIDS

Question. Mr. Secretary, I have long been a proponent of fuel cell technology and am as frustrated as anyone else is with our inability to mass-produce fuel cells at a price point that makes them commercially viable to most markets. Your proposal to reduce the Vision 21 Hybrids account by $8.4 million peaks my interest as the Department has long touted the wonders of the Vision 21 program. With a reduction of this amount, I can only imagine one of two outcomes. Either we have hit the price point and these units are ready for mass development, or the technology has underperformed and DOE is making the decision to abandon the program. I don't believe we have Vision 21 Hybrids being produced commercially, so can you explain the decision that led to the reduction in this program?

Answer. The $13.5 million for Vision 21 Hybrids in the fiscal year 2003 budget is for the completion of DOE-funded work on tubular solid oxide fuel cell systems and fuel cell/turbine hybrid systems. The fiscal year 2004 budget request of $5 million supports a redirected Vision 21 enabling cost reduction and performance enhancement program to emphasize SECA-based low-cost, Vision 21 fuel cell/turbine hybrid and Vision 21 zero-emissions system concepts.

Question. Are we on target with the goals set by DOE and will we continue on target at this funding level?

Answer. The Department's goals for tubular solid oxide fuel cell turbine hybrids systems will be achieved with the conclusion of activities in fiscal year 2003. Tests on a first-of-a-kind tubular solid oxide fuel cell/turbine hybrid system have contributed valuable design knowledge that will be used in the next phase of the Vision 21 hybrids program, which is focused on SECA-based hybrid systems. The funds proposed for fiscal year 2004 are appropriate for the re-directed effort focused on SECA-type fuel cells.

FOSSIL ENERGY—DISTRIBUTED GENERATION—FUEL CELLS—SOLID STATE ELECTRICITY CONVERSION ALLIANCE (SECA)

Question. Mr. Secretary, I am extremely interested in the SECA program and am watching its progress with high hopes. I know that DOE has recently decided to add two new industry teams to the program, yet has proposed reducing funding for the core program from $33.8 million to $23.5 million. I am concerned that reducing the funding and trying to support additional teams will cause the program to slow, when it is poised to make great strides. Additionally, it is my understanding some teams may be under performing, and some of the competing technologies may show little promise for future development. Can you update the Subcommittee on the progress of the SECA program and explain how you propose allocating resources in fiscal year 2004 to ensure we are providing sufficient resources to the teams showing the most promise?

Answer. The Solid State Energy Conversion Alliance (SECA) Program is progressing extremely well with implementation as planned and promised. The SECA industry teams are making good progress towards their Phase 1 performance targets for prototype demonstrations in fiscal year 2005/fiscal year 2006. In fiscal year

2003, the second full year for the initial four industry teams, the teams have built, tested, and evaluated small single "button" cells, completed designs for multi-cell stacks, improved performance, and reduced proof of concept volume. The new industry teams represent design alternatives that will enhance the prospects of success of SECA fuel cells for a broader market.

The Department is requesting in fiscal year 2004, $33 million for the SECA Program from several research budget elements. Primary funding of $23.5 million will be provided from the Distributed Generation Fuel Cells Innovative Concepts budget line. This funding will be primarily for the six industry teams. In addition, $6.0 million for SECA from Fuel Cells Advanced Research will be used for the SECA core technology program, $1.5 million for SECA from Advanced Research—for research on materials for coal-based SECA systems, and $2.0 million for SECA from Advanced Metallurgical Research (Albany), for metallurgical research applicable to general SECA systems.

NAVAL PETROLEUM AND OIL SHALE RESERVES—ROCKY MOUNTAIN OIL TECHNOLOGY CENTER (RMOTC)

Question. I notice the Naval Petroleum Account proposes closing the Rocky Mountain Oil Technology Center (RMOTC). Could you provide the committee with the number of industry proposals to partner with this facility for each of the past five years?

Answer. RMOTC received 151 proposals from fiscal year 1999 through the current fiscal year 2003. These proposals were from a variety of small businesses, major industry leaders, and international consortia and cover testing related to: drilling technology, coal bed methane, oil shale production, enhanced oil recovery, CO_2 sequestration, produced water management, environmental rehabilitation, renewable energy development, homeland security, reservoir services and flow assurance. The proposals are broken down accordingly; 25 in fiscal year 1999; 25 in fiscal year 2000; 31 in fiscal year 2001; 29 in fiscal year 2002; and 41 fiscal year 2003 (YTD).

Question. It is my understanding industry partnerships to promote advanced oil recovery utilize this center with great success. I am also aware of renewed interest by industry to re-examine the potential of oil shale production. If we were to follow your recommendation to reduce the oil program by 65 percent and close RMOTC, what other avenues are available for independent producers to partner with DOE to research avenues of increasing domestic production?

Answer. The President's budget does request $41.6 million for research and development in oil and natural gas, and that money will be targeted to the most promising opportunities. We hope that industry will independently increase its funding for recovery research, which would be appropriate, and the Administration supports across the board tax incentives for R&D and investment in domestic production of all kinds. An important action the Government could undertake is to increase access to lands for oil and gas exploration resulting in increased domestic production without any cost to taxpayers.

If the Center were closed, those activities would have to be conducted at private facilities such the Gas Technology Institute's Catoosa test facility in Oklahoma.

Question. Is it your belief DOE holds no responsibility to work with industry to advance domestic fossil fuel production?

Answer. The Department of Energy supports private industry development of domestic fossil fuels in every way. We are committed to research to increase the recoverable resource base of oil and natural gas and research to reduce the cost of production and protect the environment. We have a national laboratory working on ways to mitigate the environmental impacts of fuels production and consumption. We support tax and regulatory changes that would encourage domestic energy production, and we support making Federal lands available for exploration and development of fossil fuels. The Department of Energy fully supports the Administration's National Energy Plan, which makes explicit its support for more domestic energy production of every type.

FOSSIL ENERGY—FUTUREGEN

Question. Mr. Secretary, we talked a little bit about the FutureGen proposal when you came to see me earlier this week. Montanans are very excited about this project and my office has been working with our Governor's office and a large group of other entities wanting to make sure Montana is given full consideration as a possible site for the project. Can I have your assurance the Department will work with me and the State of Montana to make sure Montana's unique geographic and geological offerings are taken into full consideration as the site selection process moves forward?

Answer. I can assure you that we will be glad to work with Montana, and any other interested states, to ensure that the FutureGen site selection process will be a fair and open competitive process. Montana will be given full consideration, along with other sites proposed for evaluation.

SOLID STATE LIGHTING

Question. In reply to: believe you're aware of the Solid State Lighting Initiative, which this subcommittee supported last year with an appropriation of $3 million. Your budget request includes $5 million for this program, which has significant promise in terms of energy savings, environmental benefits, and lower costs to consumers. I understand that the Department has investigated and calculated these potential benefits while developing a "Road Map" for the solid-state lighting program. Would you share with the Committee the Department's conclusions?

Answer. The Department believes that solid state lighting has the potential to create the technical foundation to revolutionize the energy efficiency, appearance, visual comfort, and quality of lighting products for general illumination by achieving efficiencies upwards of 70 percent (source efficiency). In consultation with industry, the Department has estimated long-term benefits, which include annual savings of nearly 40 percent of lighting energy and $19 billion in consumer expenditures by 2020. As with all benefits modeling, the assumptions have a large impact on the results. Because modeling procedures and assumptions used to generate this estimate are different from those used in EERE GPRA models, we cannot directly compare the estimated benefits of this initiative to other EERE or other Departmental applied R&D activities. But we intend to improve the consistency in our modeling efforts. As a stand-alone document, the multi-sector forecast, *Energy Savings Potential of Solid State Lighting in General Illumination Applications*, is available at: www.eere.energy.gov/buildings/documents/.

As solid state lighting represents the most promising approach to more efficient lighting systems of the future, success in the initiative will retain the technology base and jobs in the United States (while facing increased product competition from Pacific Rim corporations supported by their governments) and will widely enable more efficient lighting systems to be applied widely. The potential for such technology is quite significant, given the very low performance characteristics of present incandescent (1 percent efficient in delivered, useful light) and fluorescent systems (20 percent).

The Department has held seven workshops over the past two years to plan out a broad agenda for research and development focused on improving the performance of compound semiconductor science in the application of general illumination. More than 300 participants attended these workshops (including the conventional lighting industry, compound semiconductor industry, academia, National Labs, research institutions, and other government agencies). In general, R&D is necessary in several areas: quantum efficiency, lifetime, performance, packaging, infrastructure, and first cost. The most recent summary document on this research agenda, *The Promise of Solid State Lighting for General Illumination*, is available at: www.eere.energy.gov/buildings/documents/.

SOLID STATE LIGHTING

Question. How far has this technology developed and what is the nature of the research that has to be concluded?

Answer. Solid state lighting (SSL) exists today in a monochromatic form (i.e. single color such as red or green). Currently, SSL is used for "exit" signs and traffic control lights, and offers several attributes beyond energy savings, such as durability and longer lifetime. Additionally, the auto industry is converting incandescent lamps applications to solid state devices (e.g. LED tail lights). To save significant energy, the science and engineering of SSL needs to mature in several performance metrics to be capable of competing in the general illumination market with high quality white light, which is the focus of the DOE SSL research.

White light SSL is in its infancy, with many prototypes in the 5 to 10 lumens per Watt (LPW) range. Newer prototypes perform in the 15 to 25 LPW range, about what an incandescent can do. Future research needs cover six concept areas:

Efficiency.—The ability of solid state light sources to convert electrons into photons is governed by three basic elements: (1) materials systems; (2) internal quantum efficiencies (IQE); and (3) external quantum efficiencies (EQE). Materials system research evaluates semiconductor materials, studying the performance and limitations of materials. IQE measures a material's ability to convert electron-hole pairs into photonic emissions, and is largely a function of the material system se-

lected. EQE measures the amount of light that leaves the semiconductor device and is available for collection and use.

Lifetime.—Technologies lasting in excess of 50,000 hours are sought. SSL research will focus on advancing our basic science understanding of the role of impurities, defects, crystal structure and other factors closely related to materials systems choices.

Lighting Performance.—(a) basic material properties and (b) semiconductor physics directly impact the evolution of photon wavelength, emission bandwidth and ultimately, color. For the future, emission spectrum approaching the spectral power distribution of natural sunlight is required.

Device Design.—Research will focus on (a) geometrical optical engineering and (b) optical simulation within the compound semiconductor—increases of 5 to 10 times present levels of optical coupling are predicted. Research on structures of the individual layers of materials will be required, as will integration of the substrate geometry and optics.

Packaging.—Investigate packaging requirements such as sealing out moisture and oxygen, managing heat transfer, and protecting optical material from UV degradation. SSL technology will assemble them into an optimized light delivery system.

Manufacturing.—Research will concentrate on significant first cost reduction through aggressive development of suitable manufacturing technologies and technical elements of the distribution infrastructure, such as technology standards.

CLIMATE CHANGE TECHNOLOGY INITIATIVE (NCCTI)

Question. The budget request includes $40 million for a new Climate Change Technology Initiative; $23 million of which is funded through this subcommittee. Why is it necessary to establish a new, separate program for this purpose?

Answer. The President's National Climate Change Technology Initiative Competitive Solicitation program is intended to complement and enrich the existing portfolio of ongoing research throughout the Federal government and help to ensure that all possible technology options are explored. The program is unique and warranted because funding will be allocated solely on the basis of the potential for a technology to contribute in significant ways future reductions or avoidances of greenhouse gas emissions, and/or their capture and sequestration (permanent storage). No program, past or present, has made technology-neutral funding allocations in this manner. In general, successful proposals would be focused on novel approaches for contributing to broader technological goals, or on innovative ways of solving or circumventing technical barriers to progress along a plausible line of technology development

Question. Weren't climate change objectives already folded into many of the Department's R&D programs like the Carbon Sequestration program within the Office of Fossil Energy?

Answer. Many of the existing DOE R&D programs aim to provide multiple public benefits such as increased energy security, reduced emissions of pollutants, and reduced emissions of carbon dioxide. The purpose of the NCCTI program is to focus solely on potential climate change benefits. In doing so, we expect to identify R&D opportunities that complement and enrich existing R&D programs. The responses to the NCCTI Request For Information, released in November 2002 and closed in January 2003, suggest that there are certain categories of novel concepts (e.g., crosscutting evaluation methodologies, research that does not clearly fall into the basic or applied research areas) that show great promise for reducing greenhouse gas emissions and that are unlikely to be eligible for or selected in procurements conducted under existing DOE programs.

QUESTIONS SUBMITTED BY SENATOR PETE V. DOMENICI

CLEAN COAL POWER INITIATIVE

Question. I compliment the Administration on continuing its commitment to the Clean Coal Power Initiative and Coal Research initiative in the fiscal year 2004 budget with a request of $320.5 million overall. I firmly believe that we should capitalize on our two greatest strengths in electricity supply—coal and nuclear. In both cases, we should address risk areas. I'd like to ensure that the coal initiatives would address issues associated with mining as well as the subsequent combustion processes. For example, a small New Mexico company in Raton has worked with Russian institutes, through the Department's Initiatives for Proliferation Prevention program, to develop instruments that allow remarkable refinement in how coal is mined. This instrument, which actually mounts on the drill head, enables the drill to automatically leave the last few inches at the top and bottom of a coal seam. The

majority of the serious heavy metal contaminants in the seam are concentrated at the edges of the seam; thus this new tool allows dramatically cleaner coal to be mined. When burned, that coal then burns much more cleanly. I continue to believe that we should focus on coal at the source in the coal R&D program and in the Clean Coal Power initiative. Mr. Secretary, does the Clean Coal Power Initiative include opportunities for advancing exciting new technologies like this, no matter what part of the overall coal utilization cycle they impact?

Answer. The current structure of the Clean Coal Power Initiative (CCPI) focuses on demonstrating advanced technologies that will provide clean, efficient, reliable and affordable electricity from coal. In order for a technology to qualify for consideration under CCPI, it must be proposed as part of an integrated power system that utilizes clean coal. If a proposed technology, associated with another part of the coal utilization cycle (such as mining), is integrated into the coal power system, it could be considered under CCPI.

OIL AND GAS RESEARCH

Question. I'm very disappointed to note that oil and natural gas technology research and development funds were again sharply cut in the Administration's budget. Oil technology R&D is reduced by nearly 65 percent below the fiscal year 2003 enacted level (from $42.3 million to $15 million in the President's request), and natural gas R&D is reduced by nearly 44 percent from ($47.3 million to $26.3 million in the President's request). These two energy sources play major roles in current national energy supplies. In New Mexico, I've noted how improved extraction technologies, which depend on continued research and development, have helped to boost production of old wells. The Senate bill would support R&D of the type done at the Petroleum Recovery Research Center at New Mexico Institute of Mining and Technology in Socorro. How would the Administration's reduced budget for oil technologies impact ongoing strong R&D programs, such as this one at New Mexico Tech?

Answer. The proposed budget would have no impact on the Petroleum Recovery Research Center at New Mexico Institute of Mining and Technology in Socorro, as there are no outstanding mortgages on projects with this institution. The proposed fiscal year 2004 budget does require the elimination of $5.9 million for projects being conducted at other universities. However, only $1.3 million is for projects that support the newly aligned oil program. This shortfall will be addressed by extending the projects over a longer period of time.

The new direction for the oil program resulting from a complete strategic review of the program, emphasizes results and focuses on customer groups in order to more effectively carry out the President's energy plan to increase energy security and improve the environment through his Clear Skies and Climate Change initiatives.

These changes were also in part a response to the results of the Investment Criteria Scorecards that were completed as part of the President's Management Agenda initiative for better R&D Investment criteria.

Additionally, the Program Assessment Rating Tool (PART) was completed for all program elements. Analysis of PART showed that the program did not link annual activities and outputs to long-term benefits. These outcomes reinforced the new program direction.

Question. What is the Administration's rationale for nearly terminating these R&D programs as the nation makes a comprehensive effort to increase our energy security and independence through reducing dependence on foreign sources and developing new sources of domestic energy?

Answer. The Office of Fossil Energy has completed its Top to Bottom Review, and is beginning to implement it. The review provides a solid first step towards a new program direction, emphasizing results and focusing on customer groups in order to more effectively carry out the President's energy plan to increase energy security and improve the environment through his Clear Skies and Climate Change initiatives.

Certain program areas and projects that do not address the specific goals of this new direction will be terminated. As stated in the President's Management Agenda, spending large budgets without a clear goal does not necessarily achieve good results.

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activities and outputs to long-term benefits. These outcomes reinforced the new program direction.

OIL AND GAS—FEDERAL TRANSMISSION SITING

Question. Congestion and inadequate transmission infrastructure has an impact on consumers. The Electric Power Research Institute estimated that transmission reliability losses cost the economy $120 billion annually. Contained in S. 14 is a provision to accelerate the permitting of transmission lines across federal lands. The provision requires the Department of Energy to take the lead in coordinating the federal permitting efforts in order to accelerate and improve the siting process. Do you believe that DOE can assist in this role and reduce the time and costs associated with permitting transmission facilities?

Answer. The process for obtaining permits for transmission lines across federal lands has been a major source of delay and unnecessary cost in the development of new transmission projects, particularly in the West where much of the land is federally owned. Better coordination is needed among a wide range of parties, including project developers, state agencies, Native American tribes, and federal agencies. DOE is well positioned to help facilitate this coordination.

FUEL CELLS

Question. The Administration's proposed initiatives for fuel cells and hydrogen R&D have been very well received in the scientific community and in the Congress. The FreedomCAR and FreedomFuel proposals would receive about $235 million in the Energy Conservation budget specifically to work on vehicle technologies ($157.6 million) and fuel cell technologies ($77.5 million). Another $88 million would go to hydrogen technology R&D through the Energy Efficiency and Renewable Energy budget. These initiatives hold great hope for this nation to move away from our heavy reliance on petroleum products for transportation.

Mr. Secretary, you know of my strong support for moving toward a hydrogen economy, but I have some concerns about the mix of the program between essential R&D and demonstration programs. A recent letter report of the National Research Council raised this issue essentially saying that in its assessment the number of fuel cell demonstration projects seem to be getting ahead of our progress on essential fuel cell R&D. Mr. Secretary, do you share my concern that we need more fundamental R&D to make progress on fuel cell technology?

Answer. The April 4, 2003 interim letter report from the National Academy of Sciences (NAS) recommended that fundamental and exploratory research should receive additional budgetary emphasis, and the DOE should develop a careful plan for evaluating, funding, and validating emerging technologies for hydrogen production, transportation, storage, and end-use. Within the background, the interim report stated that, when properly used, demonstrations have a place in a balanced research program because they can lead to cost reductions and accelerate the development of codes, standards, environmental permitting, and strategies for inspection and monitoring. But, demonstrations also risk distorting budgets and diverting effort toward technology with limited potential. Development of a careful plan for funding and evaluating demonstrations to address this risk will serve the public interest.

Since the time of the NAS letter, the DOE Office of Science (SC) hosted a workshop to determine the basic science needs that support hydrogen and fuel cell technology development. SC is currently developing a research plan based on the outcomes of that workshop. The DOE plan is based on the Hydrogen Vision and Roadmap that were developed in collaboration with over 200 technical experts. The current DOE plan includes 80 percent of funding for research and development and 20 percent of funding for technology validation. These technology validation projects are cost-shared 50/50 by industry partners. Strong leveraging of Federal dollars indicates private sector support of the RD&D pathway we have outlined and that our research validation approach is sound. The results of technology validation are critical to refining and directing future research and development efforts.

Question. What is your assessment of the progress of R&D on liquid hydrogen, compressed gas, and on several carrier fuels that would transport hydrogen in vehicles?

Answer. Liquid and compressed hydrogen tanks are relatively mature technologies that are suitable for near-term demonstrations of hydrogen-powered vehicles. Development of pressurized insulated vessels has reduced evaporative losses in liquid tanks. However, liquid tanks do not meet the volume targets for on-board storage and liquefying hydrogen incurs a sizable energy penalty. Development of low-permeation liners, high-strength fibers, and conformable tanks has led to fab-

rication of 5,000 and 10,000 psi gaseous hydrogen tanks. However, these compressed gas tanks do not result in the required 300-mile range while also meeting vehicle weight and space requirements. Therefore, the long-term effort of the DOE program will be the development of low-pressure, solid-state materials that store hydrogen, such as carbon nanotubes, hydrides and alanates.

Question. What in your view is the appropriate mix of fuel cell R&D and demonstration projects?

Answer. Every research activity must be evaluated with consideration to its own particular factors, including the state of research progress. At this point, we believe that an 80/20 fuel cell R&D/demonstration mix, where demonstration projects require a minimum 50 percent cost share by industry, is appropriate.

Question. I note that researchers at Los Alamos National Lab continue to make great progress in fuel cell research and are poised to be a center of excellence in this area. I believe the nation needs this center to integrate a number of separate specialties to more efficiently develop commercially-ready fuel cell systems. Previous budget submissions led me to believe this was also part of the Administration's thinking. What is the Department's current position on establishing a national fuel cell research center?

Answer. We appreciate the major advances that Los Alamos National Laboratory (LANL) has made in polymer electrolyte membrane (PEM) fuel cells and that they hold seminal patents in the field. For example, LANL scientists were responsible for achieving the breakthrough that allowed a 90 percent reduction in the platinum required by fuel cell electrodes. This breakthrough significantly lowered the cost of PEM fuel cells and stimulated the large-scale automotive industry investment that exists today.

With respect to establishing a national center for fuel cell research, the Department is currently studying this concept.

Question. What level of funding for fuel cells could be effectively utilized to advance this exciting technology as rapidly as possible?

Answer. The Fossil Energy and Energy Efficiency and Renewal Energy Fuel Cells Programs are working with partners to accelerate the development and successful market introduction of these technologies.

In fiscal year 2004, the Fossil Energy Budget Request is $44.5 million for the continuation of the entire program, with emphasis on the Solid State Energy Conversion Alliance (SECA) where efforts are underway to drastically reducing fuel cell costs to make them more broadly applicable and widespread commodity in the competitive, mature distributed generation and auxiliary power markets. Funding at the requested level will allow six competing SECA industry teams and about 19 core technology participants to advance the technology at an accelerated pace.

In fiscal year 2004, the Energy Efficiency and Renewal Energy (EERE) budget request is $77.5 million for development of polymer electrolyte membrane fuel cells in support of the President's FreedomCAR and Hydrogen Fuel Initiative. This request level is appropriate for EERE's planned fuel cell R&D and is consistent with our technology roadmap plans. Research in membranes, electrodes, fuel processing and system components will lead to $30/kW engine costs, 60 percent energy efficiency and 5,000 hours durability on hydrogen. Fiscal year 2004 funding for fuel cells and hydrogen is the first year of the President's Initiative, which will accelerate commercialization of hydrogen fuel cell vehicles by 15 years to 2015.

HIGH TEMPERATURE SUPERCONDUCTIVITY

Question. If I could change subjects for a moment, I would like to ask you about the Energy Efficiency and Renewable Energy budget, and high temperature superconductivity R&D. It is my sense that within DOE there is support to move into grid-level demonstration projects to begin effective utilization by utilities of high-temperature superconductivity technology for more reliable supplies of electricity. The request of $76.9 million for electricity reliability activities is 9 percent below the $85 million approved for fiscal year 2003 and does not move us in that direction.

Answer. Within the $76.9 million request, there are significant grid-level demonstration projects that will be more visible in fiscal year 2004 in which utilities will begin effective utilization of high temperature superconductivity. The most notable is a planned Long Island installation of a superconducting transmission power cable able to serve 300,000 homes. This could lead to a future superconductivity "backbone" being put in place to supply electricity to most of Long Island. Similar projects are planned in Albany, NY, and Columbus, OH. Our intent is to move as rapidly as possible to effective utilization of several types of grid technologies (transmission and distribution cables, transformers, generators, and fault current limiters)

while maintaining research on higher capacity, cost-effective, superconducting wires and other key enabling technologies.

Question. What is the major thrust of the Department's fiscal year 2004 budget proposal for high-temperature superconductivity?

Answer. In the Department's fiscal year 2004 budget proposal for high-temperature superconductivity, the major thrust is to improve Second Generation superconducting wire (longer lengths, higher capacity, lower-cost processing) through collaboration of university, national laboratory, and private company scientists; while simultaneously moving as rapidly as possible to effective utilization of transmission and distribution cables by installing and testing different cable types in the electric grid. The latter work is carried out by industry teams consisting of a utility, cable manufacturer, superconducting wire supplier as well as special expertise from the national labs and universities.

QUESTIONS SUBMITTED BY SENATOR ROBERT C. BYRD

TECHNOLOGY TRANSFER—CLEAN ENERGY TECHNOLOGY EXPORT (CETE)

Question. Mr. Secretary, Congress has urged the Administration to support increased opportunities to open and expand international energy markets and export U.S. clean energy technologies to developing countries and other nations abroad. These efforts are very important to helping meet our own energy security needs while at the same time addressing related economic, job creation, trade, environmental, and climate change objectives. Additionally, such efforts could significantly aid in meeting other nations' infrastructure and development needs while also increasing the deployment of a range of U.S. clean energy technologies, including clean coal technologies. The Clean Energy Technology Exports (CETE) Initiative will help meet that challenge. It had its genesis within the Senate Appropriations Committee and has had broad bipartisan support. The administration has talked about such ideas on occasion, but despite such rhetoric, the participating federal agencies have done little, if anything, to implement the strategic plan. It seems you are just sitting on your hands and missing a critical opportunity. Because the Department of Energy is a leading agency involved in the implementation of the CETE Initiative as called for by the Congress and released by the Administration in October 2002, what specific actions is your agency taking to work with the other federal agencies and engage non-governmental organizations, private sector companies, and other international partners with regard to this plan?

Answer. The Department is involved in many activities with other federal agencies, non-governmental organizations, private sector companies and international partners to expand the market for clean energy technologies. One such effort is the current joint working group on U.S.-China Olympic cooperation. This cooperative effort is consistent with CETE objectives and aims to deploy clean energy technologies for the 2008 Summer Olympic Games, by facilitating U.S. industry interest in the Chinese market, and promoting U.S.-made equipment and services while protecting the global environment. One of the eleven areas of mutual interest for cooperation is clean coal technology. To this end, the Department's Office of Fossil Energy has developed a plan to: use U.S. NO_X Control Technologies for Beijing region power plants; jointly design coal preparation plants; and reach out to U.S. industry on business opportunities.

Question. Can you tell me when the Appropriations Committee will receive the required annual CETE strategic plan progress report that was due to this committee on March 1, 2003?

Answer. The Department expects to submit the CETE report to the Congress by the end of July 2003.

QUESTIONS SUBMITTED BY SENATOR DIANNE FEINSTEIN

NUCLEAR WEAPONS TESTING

Question. Mr. Chairman, thank you for holding this hearing and Secretary Abraham, thank you for coming. I am interested to hear your answers to many subjects important to Californians. Among them are the Administration's position on the use and development of low-yield nuclear weapons; banning fraud and manipulation in the energy sector; and the President's hydrogen fuel and fuel cell car proposals in the fiscal year 2004 Department of Energy Budget. First and foremost, I want to focus on the Administration's position on the use and development of low-yield nuclear weapons. The President is right that the greatest threat facing the United

States lies in the global proliferation of Weapons of Mass Destruction, and terrorist access to those weapons. But I am deeply concerned that by appearing to focus its national security strategy on its nuclear arsenal, current U.S. policy may well actually encourage proliferation, alienate our friends and allies, and promote a backlash against the United States. Instead of ratcheting back on our reliance on nuclear weapons with the Cold War over, the administration seems to be looking for new ways to use our nuclear advantage to restructure our forces so that they are more "usable"—blurring the lines between nuclear and conventional forces and legitimizing the idea that nuclear weapons can be used.

Like it or not, the United States sets the pace when it comes to international norms regarding nuclear weapons, and, in fact, just considering the use of these weapons much less actually using them threatens to undermine our efforts to stop proliferation and makes us less safe, not more.

The administration's Nuclear Posture Review, released in January 2002, stressed the importance of being prepared to use nuclear weapons. The review noted that we must plan to possibly use them against a wider range of countries. And it said that we need to develop new types of weapons so that we can use them in a wider variety of circumstances. According to press reports the review also explicitly listed seven nations Russia, China, Iran, Iraq, Syria, Libya, and North Korea against which the United States should be prepared to use nuclear weapons even though most of those nations do not have nuclear weapons themselves. That means the Administration is contemplating the first use of nuclear weapons in a conflict.

Indeed, a few months after issuing the nuclear posture review, President Bush signed National Security Presidential Directive-17, which, according to press reports, abandons a bipartisan policy of ambiguity and explicitly says that the United States might use nuclear weapons to respond to a chemical or biological attack. Clearly the administration seems to be moving toward a military posture in which nuclear weapons are considered just like other weapons in which their purpose is not simply to serve as a deterrent but as a usable instrument of military power, like a tank, a fighter aircraft, or a cruise missile.

I believe that such an approach is not in our nation's interest, nor is it consistent with our standards and values. A first use of nuclear weapons by the United States should be unthinkable, and responding to a non-nuclear attack with nuclear weapons violates a central tenet of just war and U.S. military tradition. There is no question that in the post 9/11 era a full range of policy options for dealing with new and uncertain events should be on the table. But in my view, nuclear options should not be considered as an extension of conventional options because this inevitably lowers the threshold for use.

So, if the United States is seeking to develop nuclear weapons which blur the distinction between conventional and nuclear forces and lowers the threshold for the possible use of these weapons, we must consider the message that this sends to the rest of the world. I believe that it is critical that the United States sets a very high international standard for nuclear restraint. If we do not, we may well encourage others to develop their own standards and their own nuclear arsenals.

Using nuclear weapons, even "small" ones, would cross a line that has remained sacrosanct for almost 60 years. Using a small nuclear weapon makes the use of all nuclear weapons more permissible it legitimizes their use and legitimizing nuclear weapons promotes their spread. It also puts us in greater danger should we ever have to fight a nuclear power.

Moreover, there is no real evidence that the United States needs to use nuclear weapons in the scenarios outlined in the Nuclear Posture Review or NSPD 17.

The most often-cited need for new nuclear weapons is to destroy underground bunkers. But the most important factor in destroying a deeply buried target is knowing exactly where it is. And if we know exactly where it is, we can either destroy it with conventional weapons or deny access to it by destroying entrances and air ducts.

Earlier this year, at an Energy Committee Hearing, I asked you whether Secretary Rumsfeld had been quoted correctly in The Washington Post, on the 20th of February, when he said that the Administration had no plans to develop new low-yield nuclear weapons. You said yes, he had been quoted correctly, that the Administration was only studying adaptations of existing weapons.

This week on the Floor of the Senate I offered an amendment to strike the controversial provision in the Defense Authorization Bill that will end a 10-year-old ban on research and development of low yield nuclear weapons.

The Defense Authorization Bill would repeal the decade old "Spratt-Furse" provision, which bans all development leading to the production of nuclear weapons with yields of fewer than five kilotons. I believe this prohibition should remain in full force because repealing it:

—Provides the United States no military benefit;
—Could lead to the resumption of nuclear testing;
—Undermines efforts to halt the proliferation of Weapons of Mass Destruction; and
—Blurs the line between conventional and nuclear weapons.

Now that the ban will be repealed, what are the exact plans for the Administration's study, development, and testing of low-yield nuclear weapons?

Answer. The Department has no research currently under way to develop low-yield or other new nuclear weapons at the Department's nuclear weapon design laboratories. However, the Department of Defense and Department of Energy have begun a two to three-year study on potential modifications to current stockpile gravity bombs, the B61 and the B83. The study, known as the Robust Nuclear Earth Penetrator (RNEP) phase 6.2 study, will assess the feasibility, design definition, and cost for modifications of providing a robust earth penetrating weapon to address the threat posed by hard and deeply buried facilities.

The RNEP concept is being studied as one of a number of possible means to deal with emerging threats. Development, production and fielding of the RNEP concept would not require nuclear testing.

There has been no decision to move the RNEP to engineering development. Should this occur in the future, the Department of Energy would request funds from Congress as a separate budget line item, consistent with Section 3143 of Public Law. 107–314, in the President's budget request for that year.

I appreciate your observation that "a full range of policy options for dealing with new and uncertain contingencies should be on the table." I believe that the Department's work will not blur the distinction between nuclear and conventional weapons. I also encourage you to seek the views of the Department of Defense on the issues you raise regarding military utility of low-yield weapons and their potential contribution to the deterrent.

Question. What exactly will you do differently when this Defense Authorization Bill is passed?

Answer. Repeal of the prohibitions of Spratt-Furse would allow the NNSA's weapons laboratories to examine more fully the technical options, the investigation of which is currently prohibited by law and to a lessor extent by the Spratt-Furse provisions of the House bill. There are problems in attempting to confine intellectual efforts to "research only" rather than "research and development" because these lines are often not clear. In the end, Congress controls these activities which could lead to a recommendation to initiate engineering development, since the Department of Energy would request funds from Congress as a separate line item in the President's budget request for that year.

Question. Will the Administration seek to test these weapons?

Answer. The Administration remains committed to adhering to a moratorium on nuclear weapons testing. At the same time, the Administration has no intention of resubmitting the CTBT to the Senate for ratification.

ENERGY MARKETS

Question. Now I would like to turn to the energy markets. Over the past few years, we have seen corporate scandal after corporate scandal in the news—and nowhere has there been more fraud and market abuse than in the energy sector. In March, the Federal Energy Regulatory Commission issued its "Final Report on Price Manipulation in Western Markets" which confirmed there was widespread and pervasive fraud and manipulation during the Western Energy Crisis. The overwhelming evidence uncovered demands that California receive full and complete refunds and that FERC revise the state's long-term contracts to remedy the manipulation that has taken place and to deter future abuse.

Three years ago, this month California's energy market began to spiral out of control. The crisis forced the State of California into a severe budget shortfall. It forced the state's largest utility into bankruptcy and nearly bankrupted the second-largest utility. Now three years and $45 billion in costs later, we have learned how the energy markets in California were gamed and abused.

Yet the Senate Energy Bill doesn't prevent the type of gaming that went on during the energy crisis. The Senate bill only bans one type of specific manipulation—wash trades in the electricity market—but it does not address the natural gas market, nor does it prevent other forms of fraud and manipulation that took place in California and were detailed in the Enron memos as "Fat Boy," Ricochet," "Death Star," and "Get Shorty."

Does the Bush Administration support banning the type of fraud and manipulation that Enron engaged in?

Answer. The Administration strongly opposes illegal market manipulations and supports the prevention of fraud and manipulation in the nation's energy markets. It would not be appropriate to discuss cases involving Enron, and other energy firms that are still pending before FERC and in other forums, and this answer should not be understood as presuming the outcomes of those cases.

Question. FERC Chairman Pat Wood and FERC Commissioner Bill Massey support conforming the penalty and refund provisions in the Federal Power Act with those of the Natural Gas Act. Does the Bush Administration also support these changes?

Answer. Yes.

Question. Section 1121 of Senator Domenici's Energy Bill prevents the Federal Energy Regulatory Commission from issuing any rulemaking on the proposed Standard Market Design until July 1, 2005. What are the Bush Administration's views on delaying the Standard Market Design rulemaking until this date—especially in light of the recent revisions proposed by the FERC Commissioners in their White Paper?

Answer. In the White Paper FERC demonstrated its willingness to work with state regulators and industry to accommodate regional perspectives in the design of regional transmission organizations (RTOs) and other matters related to the formation and operation of regional wholesale markets for electricity. The Administration opposes blocking the FERC from any final rulemaking in this area for two years, which could prevent FERC from taking needed action to maintain stability in regional electricity markets.

Question. In a speech last week to the National Petroleum Council, you made some comments about the current conditions in our natural gas markets. As you know, low U.S. production, low inventories, and high prices are battering industries that rely on natural gas as a raw material or energy source. In addition to the chemical, aluminum, and fertilizer industries—the ethanol industry is also dependant on natural gas. Since most ethanol plants rely solely on natural gas, is this the time to mandate billions of gallons of ethanol into our fuel supply and force many more ethanol plants to be built?

Answer. New, modern dry mill ethanol plants use about 40,000 BTUs of natural gas per gallon of ethanol produced (76,000 BTUs). A small additional amount of natural gas will be used in the production of fertilizer used to grow corn. For the incremental 2.5 billion gallons that would need to be produced to reach the 5 billion gallon per year target under a renewable fuels standard, natural gas demand would be about .075 TFC higher in 2015. This would be an increase of about half of 1 percent in expected 2015 gas demand. We do not believe this is a significant amount given the potential factors that will drive natural gas supply and demand over the next 10–20 years.

Question. Is the ethanol mandate something DOE is considering in evaluating our long-term natural gas needs?

Answer. As discussed in the answer above, we do not believe that the impact of a 5 billion gallon per year renewal fuels standard will have a significant impact on future natural gas demand.

HYDROGEN FUEL

Question. I support research and development efforts to make hydrogen fuel and fuel cell powered automobiles a reality. In fact, companies and universities based in California have been at the forefront of developing hydrogen and fuel cell technologies. However, I am concerned about the overwhelming amounts of energy it will take to extract hydrogen fuel on a large scale. Since the actions we take today will influence what kind of hydrogen economy develops 10 or 20 years from now, how does the Administration propose to generate this large amount of energy?

Answer. A big advantage of hydrogen as a transportation fuel is its potential to be produced efficiently and economically via a number of processes and from a variety of domestic resources, such as natural gas and other fossil fuels, abundant renewables, and nuclear. The Department has established a balanced effort to research and develop hydrogen production capabilities from all of these resources. Today, the most cost-effective and efficient process is steam reforming of natural gas. Natural gas reforming is a route for producing hydrogen, particularly in the near term because of its current economics and the availability of existing infrastructure. Use of coal with sequestration, renewable resources, and nuclear are other routes for producing hydrogen over the long term. Although hydrogen production in the future is not likely to come from natural gas alone, an Energy Information Administration (EIA) calculation indicated that if 36 million hydrogen fuel cell vehicles were on the road by 2025, it would add about 5 percent to total natural

gas that will be used in the United.States that year. This increase would be more than offset by natural gas demand reduced by new advanced technologies and efficiency improvements to existing technologies under development within the EERE portfolio. EERE's analysis, based on our fiscal year 2004 budget request, indicates that by 2020 the industrial, buildings, and other portions of our portfolio will be freeing up some 11 percent of expected natural gas demand. In the future, hydrogen will likely be produced from a diverse suite of domestic resources, such as renewables, nuclear, natural gas and, if carbon capture and sequestration technologies are perfected, coal. Thus, the domestic resources needed to produce large amounts of hydrogen are available and, with continued research and development, the necessary production processes should meet required efficiency and cost objectives to facilitate a fuel cell vehicle commercialization decision by industry in 2015.

ELK HILL

Question. The Department of Energy entered into a Settlement Agreement with the State of California to compensate the State for its interest in the Elk Hills oil reserve. The Settlement Agreement calls for the State to receive compensation in seven annual installments. The Department has met its obligations for the first five installments. Mr. Secretary, will the Department continue to meet its obligations under this Agreement?

Answer. Estimates for the total for the remaining payments have been as high as $118 million; however, until final equity and final cost determinations are made, the precise amount is speculative. The President's budget for fiscal year 2004 requests $36 million for the payment to California, indicative of the Department's intention to meet its obligation to California. Under the agreement, if equity has not been finalized by July 2003 (which it will not be), DOE and the state should confer, and DOE must determine whether any or all of the seventh installment should be deferred.

Question. DOE has held back $26 million in compensation due to the State because DOE has taken 6 years to finalize the split of the proceeds from selling Elk Hills. Under DOE's Settlement Agreement, for the sixth installment in fiscal year 2004, the State is entitled to half of the balance in the Elk Hills School Lands Fund that's left after this holdback. Thus, the State is entitled to $59 million in Elk Hills compensation for fiscal year 2004, not the $36 million requested in your budget. Mr. Secretary, what is the Department's view of an appropriation of the full $59 million?

Answer. The Settlement Act provided for 9 percent of the net sales proceeds to be reserved in a contingent fund in the Treasury for payment to the State, subject to appropriation. The Department's estimate of 9 percent of the net sales proceeds was $324 million, of which $298 million has already been deposited into the contingent fund. The Department will adjust the amount in the contingent fund once all divestment related costs and final equity have been determined. It is now apparent that the final equity determination will not be completed until fiscal year 2006. Since 9 percent of the net revenues can only be calculated after final equity and final costs are determined, the amount of the two "equal" final payments is contingent upon events that have not yet occurred, and it will be impossible for Congress to appropriate an amount for fiscal year 2004 that would be known to be 50 percent of the remaining payment.

CONCLUSION OF HEARINGS

Senator BURNS. Thank you all very much. The subcommittee will stand in recess subject to the call of the Chair.

[Whereupon, at 10:56 a.m., Thursday, May 22, the hearings were concluded, and the subcommittee was recessed, to reconvene subject to the call of the Chair.]